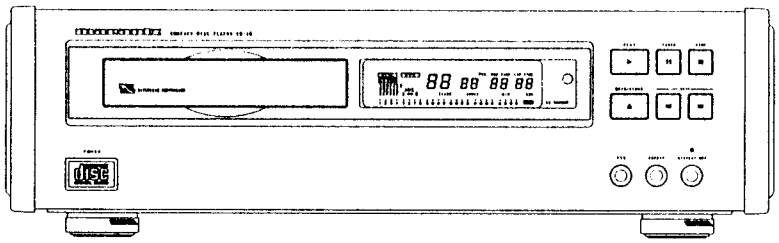
Service Manual

74 CD10 / 00B

Compact disc player



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marantz®

model CD-10

First issue : 1992

PCS67 925

MARANTZ DESIGN AND SERVICE

Using superior design and selected high grade components, MARANTZ company has created the ultimate in stereo sound. Only **original MARANTZ parts** can insure that your MARANTZ product will continue to perform to the specifications for which it is famous.

Parts for your MARANTZ equipment are generally available at our National Marantz Subsidiary or Agent.

MARANTZ EUROPE B.V.
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routing ind.

ORDERING PARTS

Parts can be ordered either by mail or by telex. In both cases, the correct part number has to be specified. The following information must be supplied to eliminate delays in processing your order:

1. Complete address
2. Complete part numbers and quantities required
3. Description of parts
4. Model number for which the part is required
5. Way of shipment
6. Signature: any order form or telex must be signed, otherwise such part order will be considered as null and void.

ADDRESSES

AUSTRIA
MARANTZ
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1130 Wien
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Finland

All of the above locations are fully equipped to take care of your total service needs or can advice you. Because various countries have differing configuration requirements, it is necessary that you contact the service facility in your particular country.
In the event that there is no service location listed for your country, please contact the nearest facility for the necessary assistance.

In case of difficulties, do not hesitate to contact the Technical Department at above mentioned address.

1 TECHNICAL SPECIFICATIONS

Audio Characteristics
- Channels ..... 2 channels
- D/A conversion ..... 1-bit linear/channel

Frequency Characteristics
- Line output jack ..... 20 to 20,000 Hz, ± 0.2 dB
- Dynamic range ..... 96 dB
- S/N ratio ..... 108 dB
- Channel separation ..... 100 dB or more (1 kHz)
- THD ..... 0.0015 % (1 kHz)
- Wow & flutter ..... Precision of quartz
- Analog output jacks
  - Line output jacks ..... Output level 2 V RMS
    Output impedance 100 ohms
  - Matching load impedance ..... 10 k ohms or more
- Digital output ..... Pin jack, 0.5 Vp-p/75 ohms
  (Rectangular optical connector)
  optical output -19 dBm

Optical Readout System
- Laser ..... AlGsAs semiconductor
- Wavelength ..... 780 nm

Signal System
- Sampling frequency ..... 44.1 kHz
- Quantization ..... 16-bit linear/channel
- Error correction ..... Cross-interleave read solomon code (CIRC), Class A D/A conversion

Power Supply
- Voltage ..... 230 V
- Line Frequency ..... 50 Hz or 60 Hz
- Power Consumption ..... 18 W

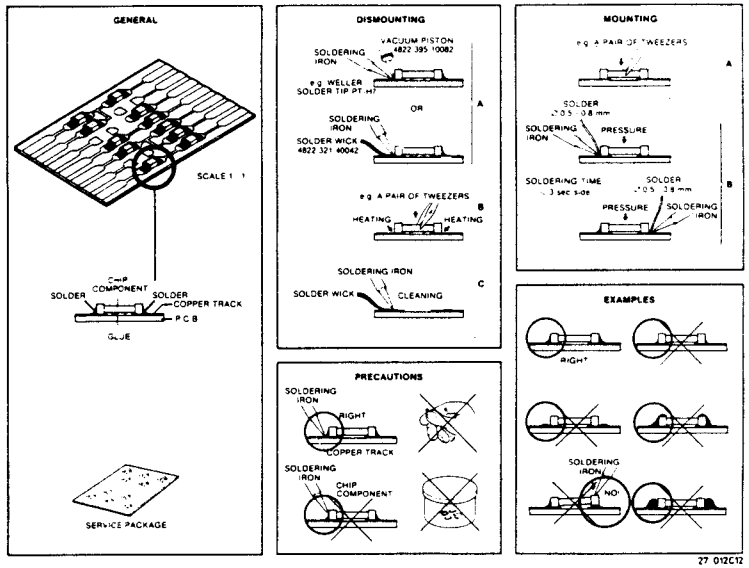
Cabinet, etc.
- Dimensions
  - Width ..... 457 mm
  - Height ..... 136 mm
  - Depth ..... 358 mm
- Weight ..... Approx. 16.5 kg
- Operating temperature ..... + 5°C ~ + 35°C
- Operating humidity ..... 5 % ~ 65 % (without Dew)

Accessories
- Remote control unit (RC-10 CD) 1
  - Dimensions (W x H x D) ..... 60 x 15 x 175 mm
  - Weight (without batteries) ..... 85 g
- R03 Batteries 2
- Stereo audio cable with RCA pins ..... 1 Pair
- Digital signal cable with RCA pins 1

* Improvement may result in changes in specifications and design without notice.

SERVICE TOOLS

Audio signals disc	4822 397 30184
Disc without errors (test disc 5) + disc with DO errors, black spots and fingerprints (test disc 5A)	4822 397 30096
Disc 65 min 1 kHz without pause	4822 397 30155
Max. diameter disc(58.0 mm)	4822 397 60141
Torx screwdrivers	
Set (straight)	4822 395 50145
Set (square)	4822 395 50132
13th order filter	4822 395 30204
Service cable (4p)	4822 321 21284
Service flexfoil (14p)	4822 322 40066
Service connector (14p)	4822 267 50676
Green LED CQY G11	5322 130 32182
Insulation cover	4822 444 60655



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(GB) WARNING

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD).
Careless handling during repair can reduce life drastically.
When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance.
Keep components and tools also at this potential.

ESD

(F) ATTENTION

Tous les IC et beaucoup d'autres semi-conducteurs sont sensibles aux decharges statiques (ESD).
Leur longevite pourrait être considerablement ecourtee par le fait qu'aucune precaution n'est prise à leur manipulation.
Lors de reparations, s assurer de bien être relié au même potentiel que la masse de l'appareil et enfiler le bracelet serti d'une resistance de securité.
Veiller à ce que les composants ainsi que les outils que l'on utilise soient également à ce potentiel.

(D) WARNUNG

Alle ICs und viele andere Halbleiter sind empfindlich gegen elektrostatische Entladungen (ESD).
Unsorgfältige Behandlung bei der Reparatur kann die Lebensdauer drastisch vermindern.
Sorgen sie dafur, dass Sie im Reparaturfall über ein Pulsarmband mit Widerstand mit dem Massepotential des Gerates verbunden sind.
halten Sie Bauteile und Hilfsmittel ebenfalls auf diesem Potential.

(NL) WAARSCHUWING

Alle IC's en vele andere halfgeleiders zijn gevoelig voor electrostatische ontladingen (ESD).
Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen verminderen.
Zorg ervoor dat u tijdens reparatie via een polsband met weerstand verbonden bent met hetzelfde potentiaal als de massa van het apparaat.
Houd componenten en hulpmiddelen ook op ditzelfde potentiaal.

(I) AVVERTIMENTO

Tutti IC e parecchi semi-conduttori sono sensibili alle scariche statiche (ESD).
La loro longevita potrebbe essere fortemente ridatta in caso di non osservaz one della piu grande cauzione alla loro manipolazione.
Durante le riparazioni occorre quindi essere collegato allo stesso potenziale che quello della massa dell'apparecchio tramite un braccialetto a resistenza.
Assicurarsi che i componenti e anche gli utensili con quali si lavora siano anche a questo potenziale.

Q101 : TDA8808T

pin	mnemonic	description
1	GCHF	Gain control input of HF amplifier. Current output from HF amplitude detector
2	V_P	Positive supply voltage
3	HFout	HF amplifier and equalizer voltage output
4	DET	HF detector voltage input
5	Sc	Starting up capacitor input
6	Si/$\overline{RD}$	On/off control (start input); ready signal output (starting up procedure successful)
7	Beq	Equalizer reference current input
8	Bgc	DC and LF gain control reference current input
9	FOC START	Focus normalizing circuit starting current
10	PLLH	PLL on hold output
11	$\overline{TL}$	Track loss output
12	$\overline{DODS}$	Drop out detector suppression input
13	V_{ext}	TDA8808T Negative supply connection for FE and FElag output stage; also substrate connection TDA8808AT Positive supply connection for FE and FElag output stage
14	LPF	Low pass filter for I_{ret}, used in track loss ($\overline{TL}$) detector and LF gain control
15	FE	Current output of normalized, switched focus error signal
16	FElag	Current output of switched focus error signal, intended for lag network
17	LO	Laser amplifier current output
18	LM	Laser monitor diode input
19	GCLF	Gain control input for AC and LF amplifiers. Current output from LF amplitude detector
20	Re2	Summation of amplified currents from D3 and D4
21	Re1	Summation of amplified currents from D1 and D2
23, 22	D1, D2	Current inputs to DC and LF photo diode amplifier
24, 25	D3, D4	Current inputs to DC and LF photo diode amplifier
26	HFin	Current input to HF amplifier
27	GND	Ground connection of device; also substrate connection for TDA8808AT
28	DEC	Decoupling input (internal bypass)

Q103 : TDA8809T

pin	mnemonic	description
1	V_P	Positive supply voltage
2	C_{osc1}	Frequency setting capacitors for oscillator
3	C_{osc2}	
4	R_{wob}	Wobble generator input
5	R_{osc}	Biassing resistor for oscillator frequency and internal amplitude
6	$\overline{DIV4}$	Divide-by-4 input
7	REdig	Digital output of sign (Re2 - Re1)
8	B3	Input control bits for off-, catch-, play-status and DAC output current
9	B2	
10	B1	
11	B0	
12	$V_{ext(+)}$	Positive external voltage input
13	$V_{ext(-)}$	Negative external voltage input (also substrate connection)
14	GND	Negative supply connection
15	RADout	Current output of amplified (Re2 - Re1) input currents
16	REin	Radial error input
17	RElag	Voltage output of integrated (Re2 - Re1) input currents
18	Lag	Connection of integrator capacitor for (Re1 - Re2) input currents
19	Lead	Lead output
20	V_{ref}	Internal reference voltage output
21	AGC	Gain control input for radial error signal
22	R_{DAC}	Biassing resistor for current output for track jumping (3½ bits)
23	offset in	Offset control input for radial offset
24	offset out	Offset control output for radial offset
25	C_{LPF}	Low-pass filter for Re1 and Re2, used for radial offset control
26	C_{HPF}	High-pass filter for Re1 and Re2, used for radial offset control
27	Re1	Input for amplified currents from photo-diodes D1 and D2
28	Re2	Input for amplified currents from photo diodes D3 and D4

Q501 : SAA7310 (1/3)

pin no.	mneumonic	description
QFP		
7 - 14	A0 - A7	**Address:** address outputs to external RAM.
15	$\overline{RAS}$	**Row Address Select:** output to external RAM (4416) which uses multiplexed address inputs.
16	R/$\overline{W}$	**Read/Write:** output signal to external RAM.
18	$\overline{MUTE}$	**Mute:** input from the microprocessor. When mute is LOW the data output DAAB, pin 37 (2), is attenuated to zero in 15 successive divide-by-2 steps. On the rising edge of mute the data output is incremented to the first 'good' value in 2 steps. This input has an internal pull-up of 50 kΩ (typ.).
19 - 21	D1 - D3	**Data:** data inputs/outputs to external RAM.
22	$\overline{CAS}$	**Column Address Select:** output signal to external RAM.
23	D4	**Data:** data input/output to external RAM.
24	MSC	**Motor Speed Control:** open drain output which provides a pulse width modulated signal with a pulse rate of 88 kHz to control the rate of data entry. The duty factor varies from 1,6% to 98,4% in 62 steps. When a motor-start signal is detected via pin 33 (42) (SWAB/SSM) the duty factor is forced to 98,4% for 0,2 seconds followed by a normal calculated signal. After a motor-stop signal is detected the duty factor is forced to 1,6% for 0,2 seconds, followed by a continuous 50% duty factor.
25	XTAL2	**Crystal oscillator output:** drive output to clock crystal (11,2896 MHz typ.).
26	XTAL1	**Crystal oscillator input:** input from crystal oscillator or slave clock.
27	V_{SS}	**Ground:** circuit earth potential.
28	V_{DD}	**Power Supply:** positive supply voltage (+ 5 V).
29	PD/OC	**Phase Detector output/ Oscillator Control input:** outputs of the frequency detector and phase detector are summed internally, then filtered at this pin to provide the frequency control signal for the VCO.
30	I_{ref}	**Current reference:** external reference input to the phase detector and data slicer. This input is required to minimize the spread in the charge pump output of the phase detector and data slicer.
31	FB	**Feedback:** output from the input data slicer. This output is a current source of 100 μA (typ.) which changes polarity when the level detector input HFI at pin 25 (32) rises above the threshold voltage of 2 V (typ.). When a data run length violation is detected (e.g. during drop-out), or when HFD at pin 26 (34) is LOW, this output goes to a high impedance state.

Q501 : SAA7310 (2/3)

pin no.	mneumonic	description
QFP		
32	HFI	**High-Frequency Input:** level detector input to the data slicer. A differential signal of between 0,5 and 2,5 V (peak-to-peak value) is required to drive the data slicer correctly. When a T_{max} violation is detected or when HFD is LOW, this input is biassed directly to its threshold voltage
34	HFD	**High-Frequency Detector:** when HIGH this input signal enables the frequency and phase detector inputs, also the feedback output (FB) from the data slicer. An internal voltage clamp of 3 V (typ.) requires the HFD input to be fed via a high impedance. This input has an internal pull-up of 50 kΩ (typ.).
35	$\overline{AM}$	**Additional Mute:** This pin is normally held HIGH. Should track loss occur the pin should be taken LOW and then the data is forced LOW at the pre-FIFO stage. The muted data will then be corrected after de-interleaving. **Note** With DINT2, DEEM/$\overline{DINT1}$, FB set to logic 0 and SDAB, SCAB set to logic 1, this pin becomes the demodulator clock output (CEFM) of the SAA7210 (CD2A).
36	$\overline{CRI}$	**Counter Reset Inhibit:** when LOW this input signal allows the divide-by-588 master counter in the DEMOD timing to run-free. This input has an internal pull-up of 50 kΩ (typ.).
37	QDATA	**Q-channel Data:** this subcoding output is parity checked and changes in response to the Q-channel clock input (see subcoding microprocessor handshaking protocol).
38	QRA	**Q-channel Request input/Acknowledge output:** the output has an internal pull-up of nominally 10 kΩ. (see subcoding microprocessor handshaking protocol).
40	QCL	**Q-channel Clock:** clock input generated by the microprocessor when it detects a QRA LOW signal.
41	DEEM/$\overline{DINT1}$	**De-emphasis output and data interpolated input:** signal derived from one bit of the parity-checked Q-channel and fed out via the debounce circuit in DEEM mode. When using the CD3A in a non-digital audio application this pin should be set HIGH (with DINT2 set LOW) to prevent data being interpolated. **Note** This pin should **only** be used in its input mode when DINT2 is LOW.
42	SWAB/SSM	**Subcoding Word clock output and Start/Stop Motor input:** open drain output which is sensed during each HIGH period and if externally forced LOW a motor-stop condition will be decoded and fed to the motor control logic circuit. When allowed to return HIGH, the motor will start. This open-drain output has an internal pull-up of 10 kΩ (typ.).

Q501 : SAA7310 (3/3)

pin no.	mneumonic	description
QFP		
43	SDAB	**Subcoding Data:** a 10-bit burst of data, including flags and sync bits, is output serially once per frame clocked by burst clock output SCAB (see Fig. 6).
44	SCAB	**Subcoding Clock:** a 10-bit burst clock 2,8224 MHz (typ.) output which is used to synchronize the subcoding data.
1	EFAB	**Error Flag:** output from interpolation and mute circuit indicating unreliable data.
2	DAAB	**Data:** this output together with its clock (CLAB) and word select (WSAB) outputs, conforms to the I^2S bus format (see Fig. 7).
3	CLAB	**Clock:** I^2S output.
4	WSAB	**Word Select:** I^2S output.
5	DINT2	**Data interpolated input:** this pin should normally be set HIGH. When using the CD3A in a non-digital audio application this pin should be set LOW (with DEEM/$\overline{\text{DINT1}}$ set HIGH) to prevent data being interpolated.
6	TEST1	**Test output 1**
17	TEST2	**Test output 2**
33	TEST3	**Test output 3**
39	TEST4	**Test output 4**

Note to the pin functions

The pin sequence of the address outputs (A0 - A7) and the data outputs (D1 - D4) has been selected to be compatible with various dynamic 16 K x 4-bit RAMs including the 4416.

Q504 : PCF3523P

pin no.	mnemonic	i/o	description
1	WSAB	I	Word Select: I2S input.
2	CLAB	I	Clock: I2S input.
3	DAAB	I	Data: I2S input.
4	EFAB	I	Error Flag: Indicating unreliable data when high. Copied to the validity bit in the DOBM output signal.
5	FS44	I	Sampling Frequency in channel status block: 44.1 KHz when this input is HIGH, 32 KHz when LOW. This input has an internal pull-up.
6	SCAB	I	Subcode Clock: 10 bit burst clock which synchronizes subcode data. Alternative function: control bit 2 of channel status block.
7	SDAB	I	Subcode Data: 10 bit burst data. Alternative function: control bit 3 of channel status.
8	VSS		Ground: circuit earth potential.
9	XIN	I	Crystal oscillator input from crystal oscillator or slave clock.
10	XOUT	O	Crystal clock drive output to clock crystal.
11	XSYS	O	System clock output: 256 x Fs.
12	TESTB	I	Test input: HIGH for normal operation. This input has an internal pull-up.
13	DOBM	O	Digital Audio Output: biphase modulated signal.
14	DOEN	I	Digital Output ENable: disables DOBM (continuously LOW) when LOW (standby). This input has an internal pull-up.
15	ATSB	I	Attenuation: when active LOW this control input provides -12 dB attenuation. This input has an internal pull-up.
16	VDD		Power supply: positive supply voltage (+5V).

Q561 : SAA7350GP (1/2)

Pin No.	mnemonic	description
1	XSEL	Crystal frequency select. This pin is used to select the master crystal frequency as follows:– XSEL HIGH = 384fs XSEL LOW = 256fs This pin defaults to XSEL HIGH when not connected.
2	$\overline{\text{DOEN}}$	One–bit Digital Output Enable. When LOW, the one–bit code outputs are made available for TDA1547 (DAC7). If unconnected the pin will default HIGH.
3	IDF3	Input data format. These three pins determine the input format the device
4	IDF2	is to operate in (see functional description). If unconnected these pins
5	IDF1	will default HIGH (i.e. burst clock mode).
6	TEST4	Test 4: This pin should be left open circuit.
7	SDI2	Serial Data Input. Used in simultaneous mode only (for the right channel signal). When not used, this pin will be internally pulled high.
8	SDI1	Serial Data Input. This should be a 16, 18 or 20–bit linear 2's complement PCM signal. In simultaneous mode this pin is used for the left channel signal.
9	WSI	Serial input Word Select signal. Signifies whether data word is for the left or right channel. Can be either fs, 2fs, 4fs or 8fs where fs is the system sampling frequency. fs can lie between 16kHz and 53kHz.
10	SCKI	Bit clock input for the serial input interface.
11	TEST1	Test 1. This pin should be left open circuit.
12	VDD	+5V power supply for the digital section.
13	VSS	Ground connection for the digital section.
14	XIN	Crystal Oscillator Input.
15	XOUT	Crystal Oscillator Output.
16	XSYS1	Buffered Oscillator Output.
17	TEST5	Test 5. In normal operation this pin should be tied LOW.
18	VDDAR	Analogue 5V supply for right channel.
19	INTR+	Output from the Right Positive switched–capacitor integrator. Input to differential op–amp.
20	FBR+	Feedback connection for the Right positive switched–capacitor integrator.
21	VSSAR	0V supply for right channel.
22	FBR–	Feedback connection for the Right Negative switched–capacitor integrator.
23	INTR–	Output from the Right Negative switched–capacitor integrator. Input to differential op–amp.
24	VRCR	High impedance voltage reference for right channel inputs. Typically VDDAR/2.

Q561 : SAA7350GP (2/2)

Pin No.	mnemonic	description
25	VDACR	Reference Voltage Supply for Right channel DAC's. Normally this will be connected to VSS.
26	VROR	Right channel Voltage Reference Output. Typically VDDAR/2.
27	VDDATR	5V supply for right channel analogue timing.
28	VSSAT	0V supply for left and right channel analogue.
29	VDDATL	5V supply for left channel analogue timing.
30	IRR	24kohm bias resistor connection for the reference current generator circuit.
31	VROL	Left channel Voltage Reference Output. Typically VDDAL/2.
32	VDACL	Reference Voltage Supply for Left channel DAC. Normally this will be connected to VSS.
33	VRCL	High impedance voltage reference for left channel inputs and for bias current generator. Typically VDDAL/2.
34	INTL–	Output from the Left Negative switched–capacitor integrator. Input to differential op–amp.
35	FBL–	Feedback connection for the Left Negative switched–capacitor integrator.
36	VSSAL	Ov supply for left channel.
37	FBL+	Feedback connection for the Left Positive switched–capacitor integrator.
38	INTL+	Output from the Left Positive switched–capacitor integrator. Input to differential op–amp.
39	VDDAL	Analogue 5V supply for left channel.
40	TEST2	Test 2: This pin should be left open circuit.
41	TEST3	Test 3: This pin should be left open circuit.
42	DOL	Digital Output Left. Left channel one–bit code for TDA1547 (DAC7), when disabled this pin will be driven LOW.
43	XSYS2	Output clock at a frequency of half the master clock frequency.
44	DOR	Digital Output Right. Right channel one–bit code for TDA1547 (DAC7). When disabled this pin will be driven LOW.

Q563 : SM5803AP

PIN No.	NAME	I/O *1	DESCRIPTION
1	DIN	Ip	Serial data input
2	BCKI	Ip	Timing clock for serial input data (Bit clock)
3	$\overline{CKSL}$	Ip	Selecting system clock *2
4	$\overline{CKDV}$	Ip	↑
5	$\overline{8X}$	Ip	Selecting over sampling H: 4fs L: 8fs
6	XTI	I	Input for oscillator or external clock input (System clock)
7	XTO	O	Output for oscillator, No connect when using external clock
8	V_{SS1}	—	Ground 1
9	CKO	O	Clock output (Same frequency as XT1 input clock)
10	MS1	Ip	Mode set control 1
11	MS2	Ip	Mode set control 2
12	MS3	Ip	Mode set control 3
13	$\overline{MDT}$	Ip	Mode set data
14	$\overline{MEN}$	Ip	Mode set enable
15	MUTE	Ip	Mute control H: Mute on L: Mute off
16	DIEM	Ip	Digital de-emphasis control H: De-emphasis on L: De-emphasis off
17	FSEL1	Ip	Selecting digital de-emphasis filter characteristics *3
18	FSEL2	Ip	↑
19	DGR	O	8fs dual output mode: Deglitch signal (Negative output) 4fs dual output mode: ↑ 4fs alternate output mode: Deglitch signal (Rch)
20	DGL	O	8fs dual output mode: Deglitch signal (Positive output) 4fs dual output mode: ↑ 4fs alternate output mode: Deglitch signal (Lch)
21	V_{SS2}	—	Ground 2
22	V_{DD}	—	Supply voltage (−5V)
23	DOR	O	8fs dual output mode: Rch data output 4fs dual output mode: ↑ 4fs alternate output mode: Multiplex clock for L/R output data
24	DOL	O	8fs dual output mode: Lch data output 4fs dual output mode: ↑ 4fs alternate output mode: Lch/Rch data output
25	WCKO	O	Output timing control (Word clock)
26	BCKO	O	Output timing control for serial data (Bit clock)
27	FSCO	O	Internal timing clock (fs rate)
28	LRCI	Ip	Multiplex clock for Lch/Rch input data (fs rate) H: Lch L: Rch

*1) I : Input terminal
Ip : Input terminal with pull-up resistance
O : Output terminal

*2)

$\overline{CKSL}$	$\overline{CKDV}$	System clock (Input to XTI)
H	H	192fs
H	L	384fs
L	H	256fs
L	L	512fs

*3)

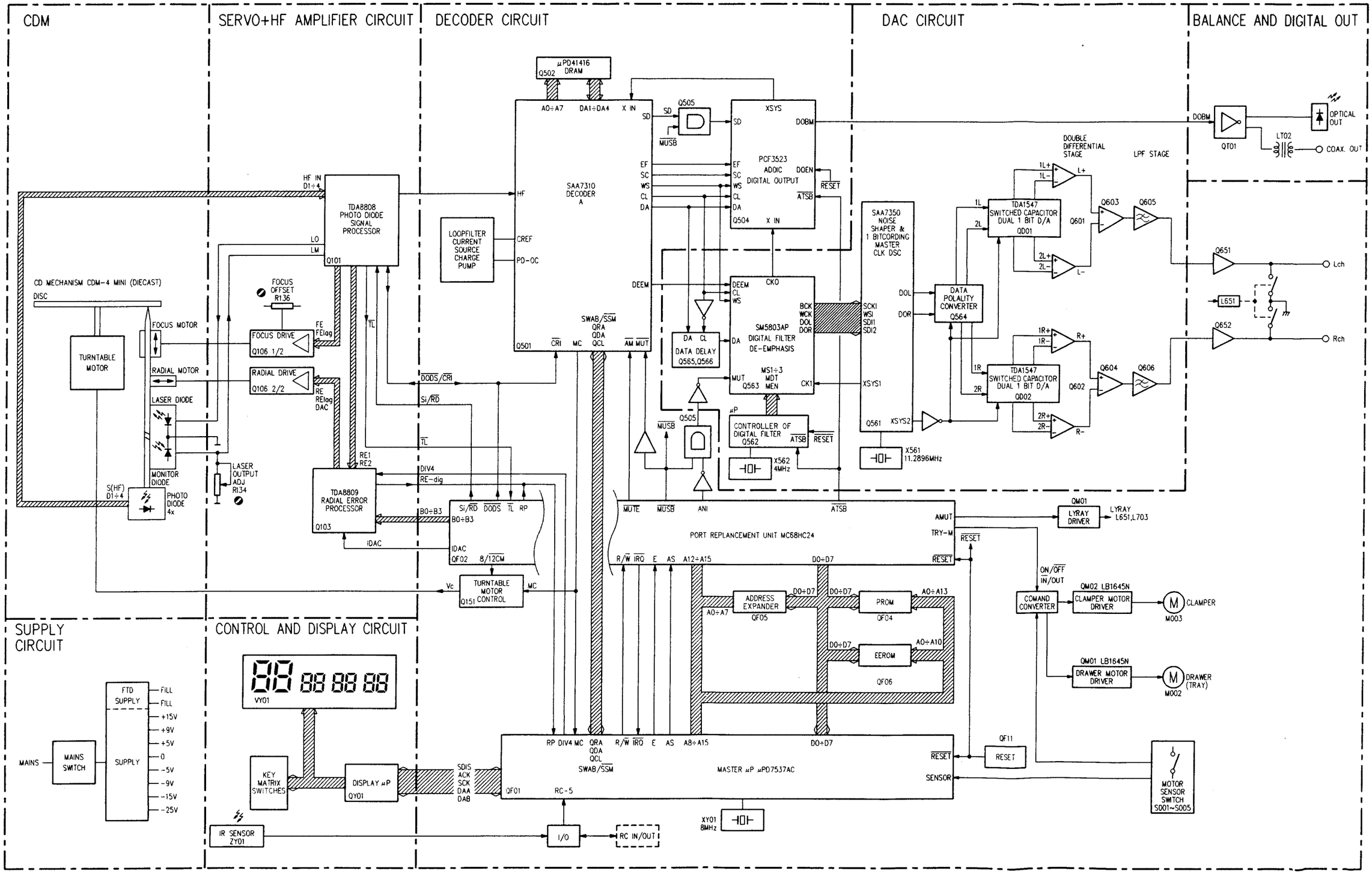
FSEL1	FSEL2	Characteristics of de-emphasis
H	H	fs = 32 kHz
L	L	fs = 44.1 kHz
L	H	fs = 48 kHz

QD01, QD02 : TDA1547

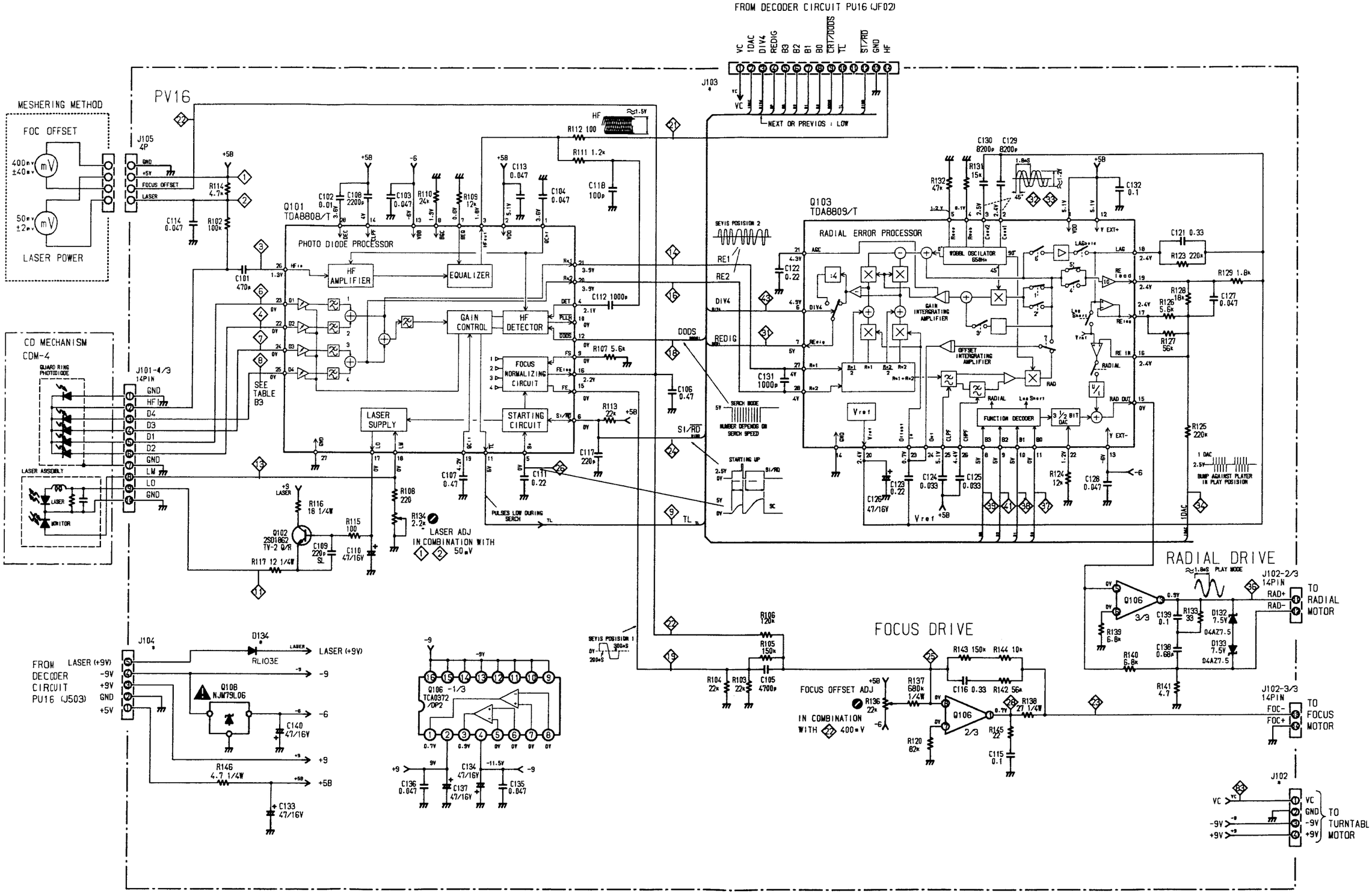
PIN NO.	NAME	DESCRIPTION
1	diggnd	0V digital supply
2	vddig	5V digital supply for both channels
3	datchr	serial one-bit data input for the right channel
4	n.c.	pin not connected, should preferably be connected to digital ground
5	clkinr	clock input for the right channel
6	vddigr	5V digital supply for the right channel. This voltage determines the internal logic high level in the right channel.
7	vssdigr	−3.5V digital supply for the right channel. This voltage determines the internal logic low level in the right channel.
8	vrefr	−4V reference voltage for the right channel switch capacitor DAC.
9	agnddacr	0V reference voltage for the right channel switch capacitor DAC. This pin should be connected to analog ground.
10	outdnr	output from the right negative switch capacitor DAC. Feedback connection for the right negative opamp
11	outdr	output from the right positive switch capacitor DAC. Feedback connection for the right positive opamp.
12	agndopar	0V reference voltage for both right channel opamps.
13	n.c.	pin not connected, should preferably be connected to analog ground.
14	outopar	output of right positive opamp
15	outnopar	output of right negative opamp.
16	vssanl	−5V analog supply
17	vddanl	5V analog supply
18	outnopal	output of left negative opamp.
19	outopal	output of left positive opamp.
20	n.c.	pin not connected, should preferably be connected to analog ground.
21	agndopal	0V reference voltage for both left channel opamps
22	outdl	output from the left positive switch capacitor DAC. Feedback connection for the left positive opamp.
23	outcnl	output from the left negative switch capacitor DAC. Feedback connection for the left negative opamp
24	agnddacl	0V reference voltage for the left channel switch capacitor DAC. This pin should be connected to analog ground.
25	vrefl	−4V reference voltage for the left channel switch capacitor DAC.
26	vssdigl	−3.5V digital supply for the left channel. This voltage determines the internal logic low level in the left channel
27	vddigl	5V digital supply for the left channel. This voltage determines the internal logic high level in the left channel.
28	clkinr	clock input for the left channel
29	n.c.	pin not connected, should preferably be connected to digital ground
30	datchl	serial one-bit data input for the right channel
31	vssdig	−5V digital supply for both channels
32	sub	−5V substrate

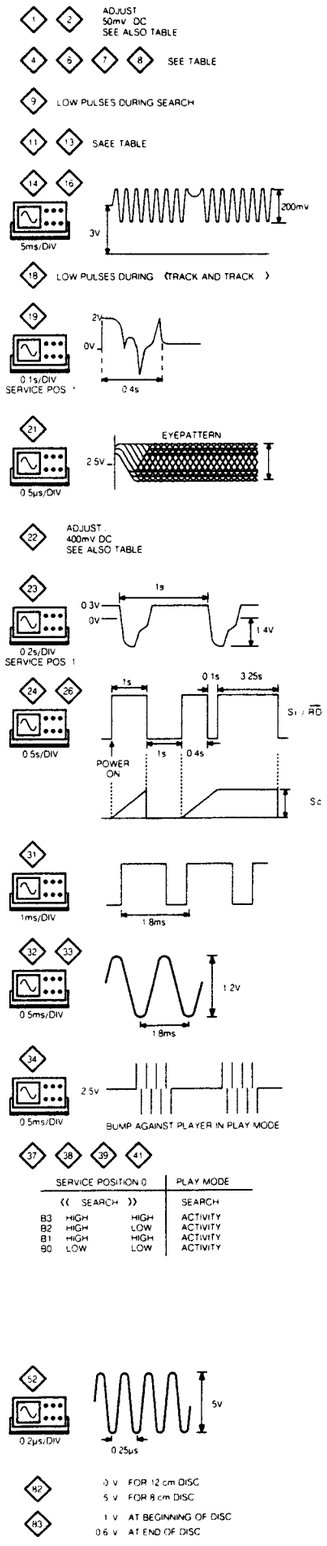
MEMO

3 BLOCK DIAGRAM

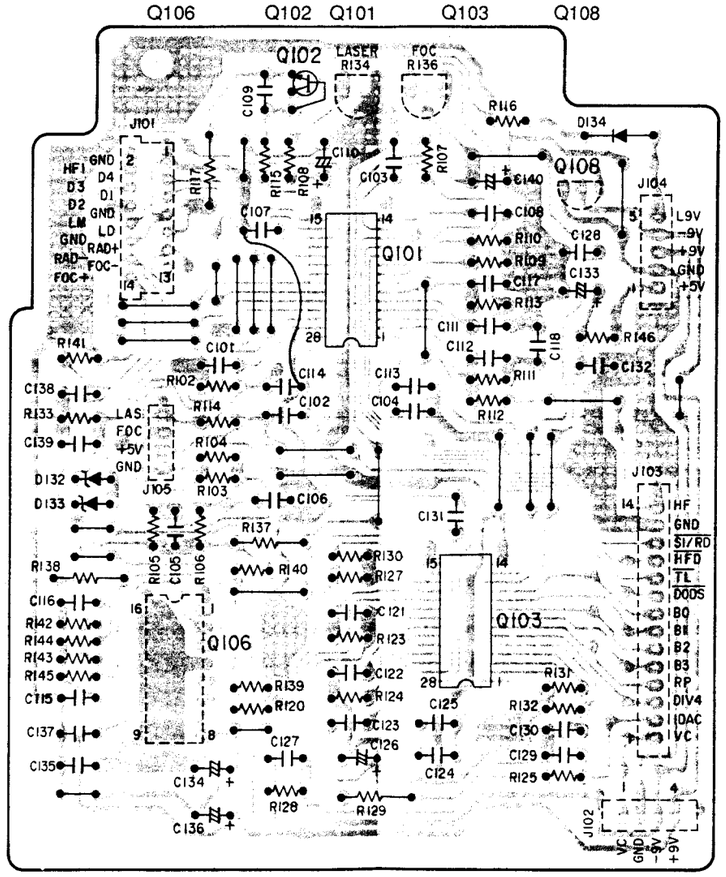


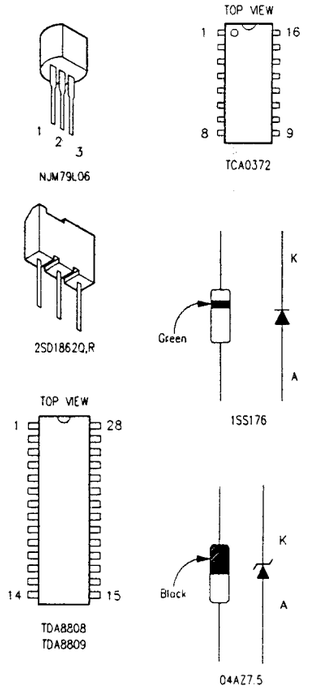
4 SCHEMATIC DIAGRAM AND PARTS LOCATIONS (PATTERN SIDE)

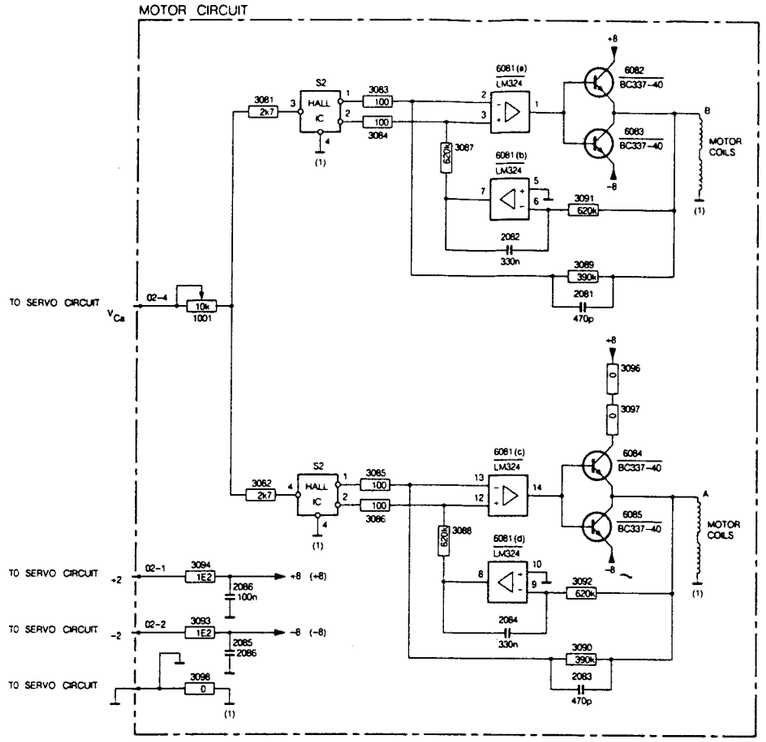


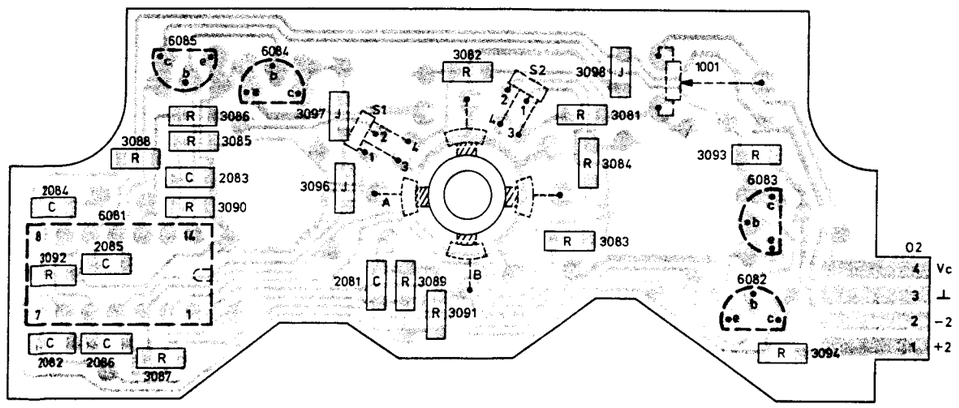

1 2 ADJUST 50mV DC SEE ALSO TABLE
4 5 7 8 SEE TABLE
9 LOW PULSES DURING SEARCH
11 13 SAEE TABLE
14 16 5ms/DIV 3V 200mV
18 LOW PULSES DURING (TRACK AND TRACK)
19 0.1s/DIV SERVICE POS 1 2V 0V 0.4s
21 0.5µs/DIV EYEPATTERN 2.5V
22 ADJUST 400mV DC SEE ALSO TABLE
23 0.2s/DIV SERVICE POS 1 1s 0.3V 0V 1.4V
24 26 0.5s/DIV 1s 0.1s 3.25s 1s 0.4s POWER ON Si / RD Sc
31 1ms/DIV 1.8ms
32 33 0.5ms/DIV 1.8ms 1.2V
34 0.5ms/DIV 2.5V BUMP AGAINST PLAYER IN PLAY MODE
37 38 39 41
SERVICE POSITION 0 | PLAY MODE
((SEARCH)) | SEARCH
B3 HIGH HIGH ACTIVITY
B2 HIGH LOW ACTIVITY
B1 HIGH HIGH ACTIVITY
B0 LOW LOW ACTIVITY
52 0.2µs/DIV 0.25µs 5V
H2 0 V FOR 12 cm DISC 5 V FOR 8 cm DISC
H3 1 V AT BEGINNING OF DISC 0.6 V AT END OF DISC

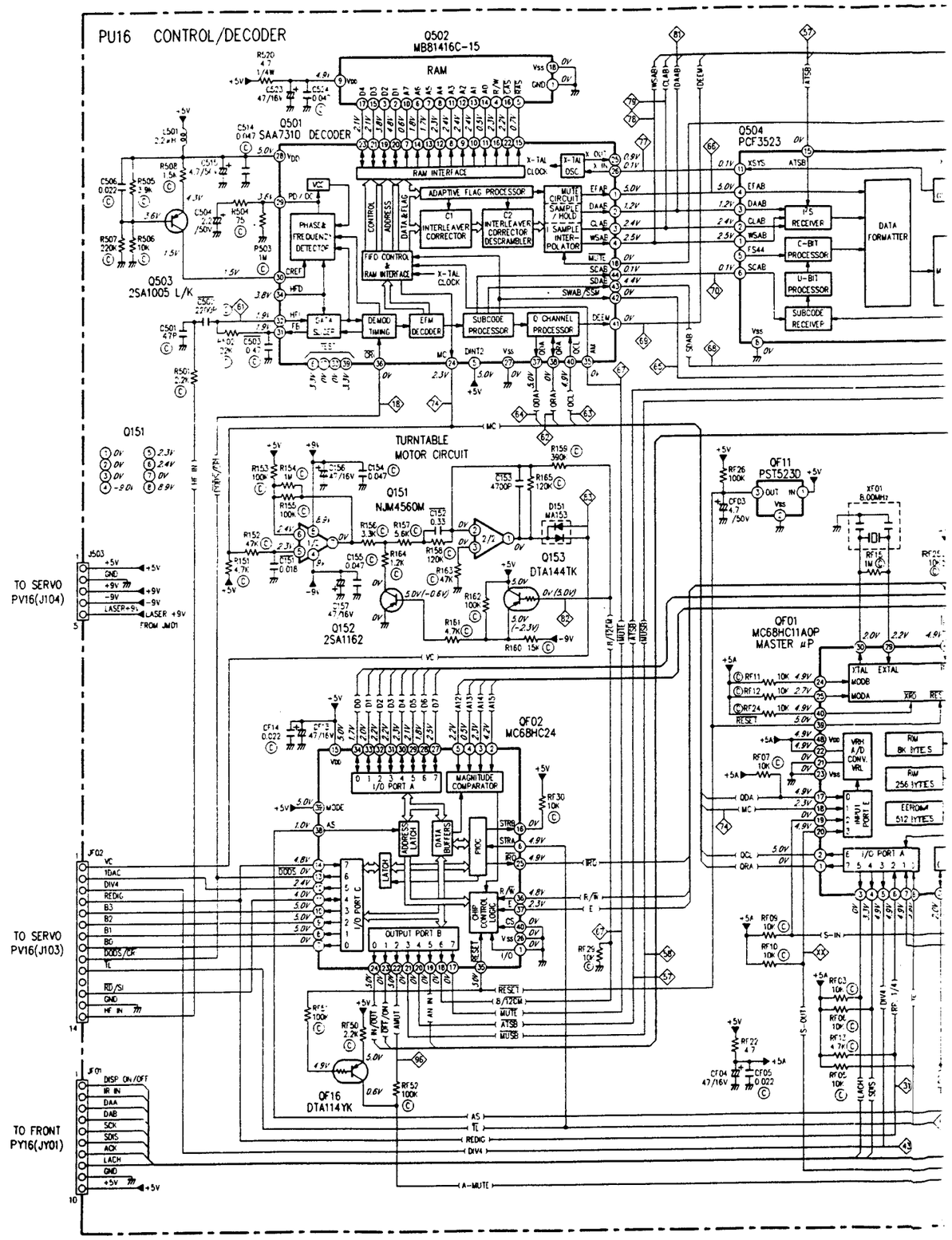
PV16 SERVO

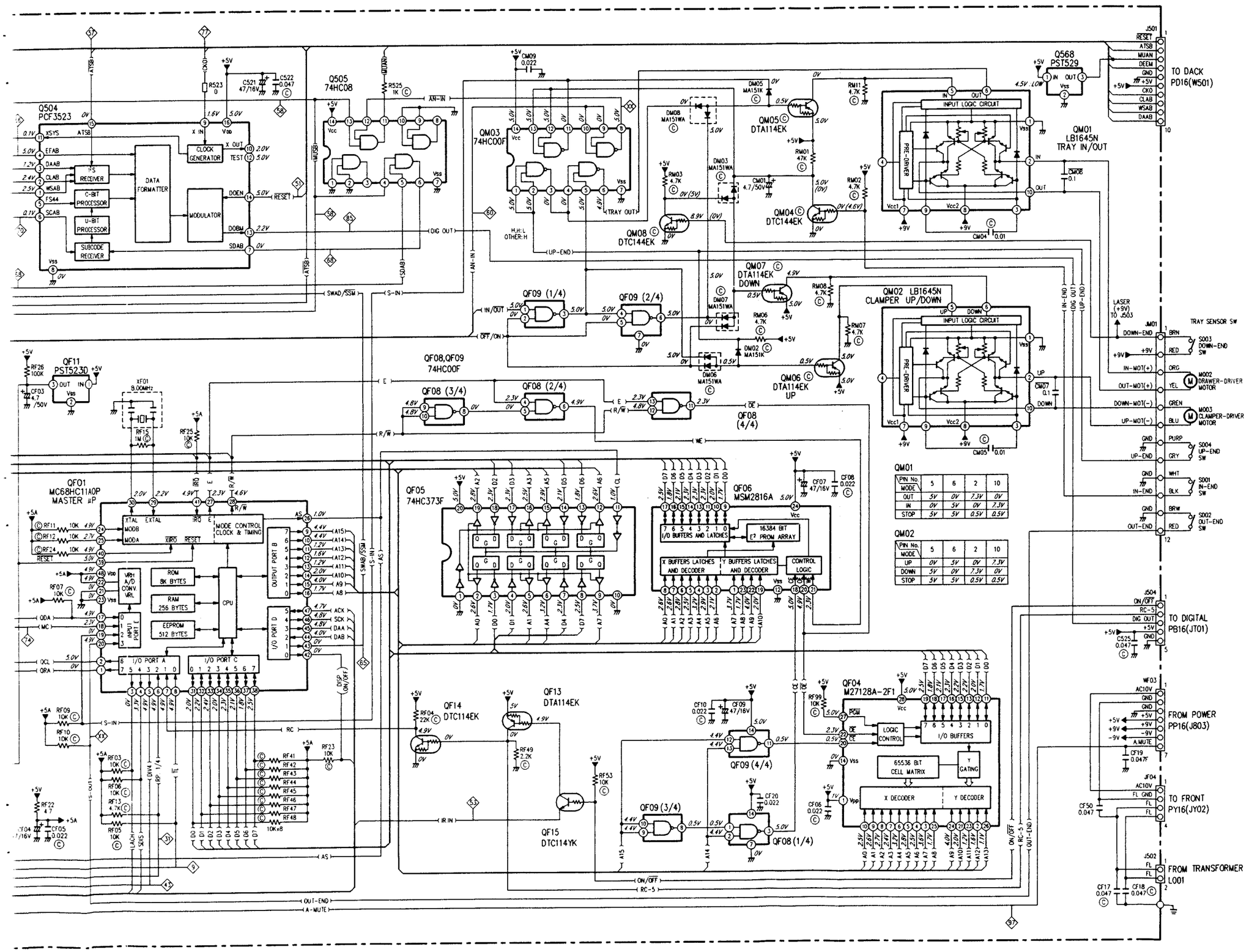

Q106 Q102 Q101 Q103 Q108
Q102
LASER R134
FOC R136
C109
R116
D134
J101
HF GND D4 D1 GND LD RAD+ FOC-
RAD- FOC+
R117 R115 R108 C110 C103 R107
C140
Q108
J104
L9V -9V +9V GND +5V
C107
C108
R110
C128
R109
C117
C133
R113
Q101
C111
C112
C118
R146
R111
C132
R141
C101
R102
C114
C102
C113
C104
R112
C138
R133
C139
LAS FOC +5V GND
R114
R104
R103
C106
D132
D133
J105
J103
HF GND SI/RD HFD TL DODS B0 B1 B2 B3 RP DIV4 IDAC VC
C131
R137
R138
R140
R130
R127
C121
R123
C122
R124
C123
C126
C116
R142
R144
R143
R145
C115
C137
C135
Q106
R139
R120
C127
R128
C134
C136
R129
Q103
C125
C124
R131
R132
C130
C129
R125
J102
VC GND 5V 9V+

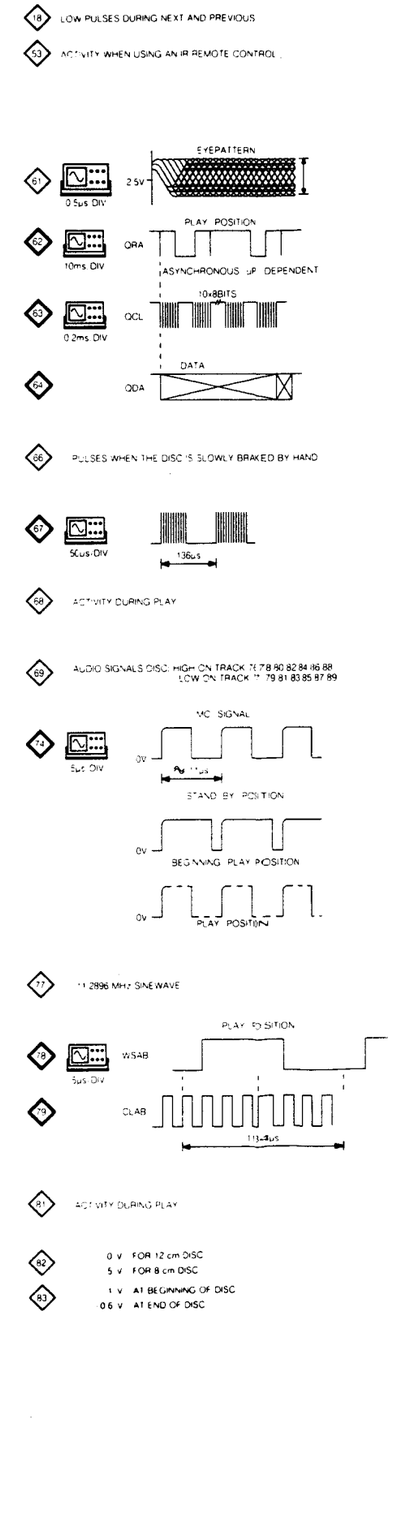

NJM79L06
TOP VIEW
1 16 8 9
TCA0372
2SD1862Q,R
Green
K A
1SS176
TOP VIEW
1 28 14 15
TDA8808
TDA8809
Black
K A
04AZ7.5


MOTOR CIRCUIT
TO SERVO CIRCUIT
TO SERVO CIRCUIT
TO SERVO CIRCUIT
TO SERVO CIRCUIT
MOTOR COILS
MOTOR COILS
HALL IC
LM324
BC337-40

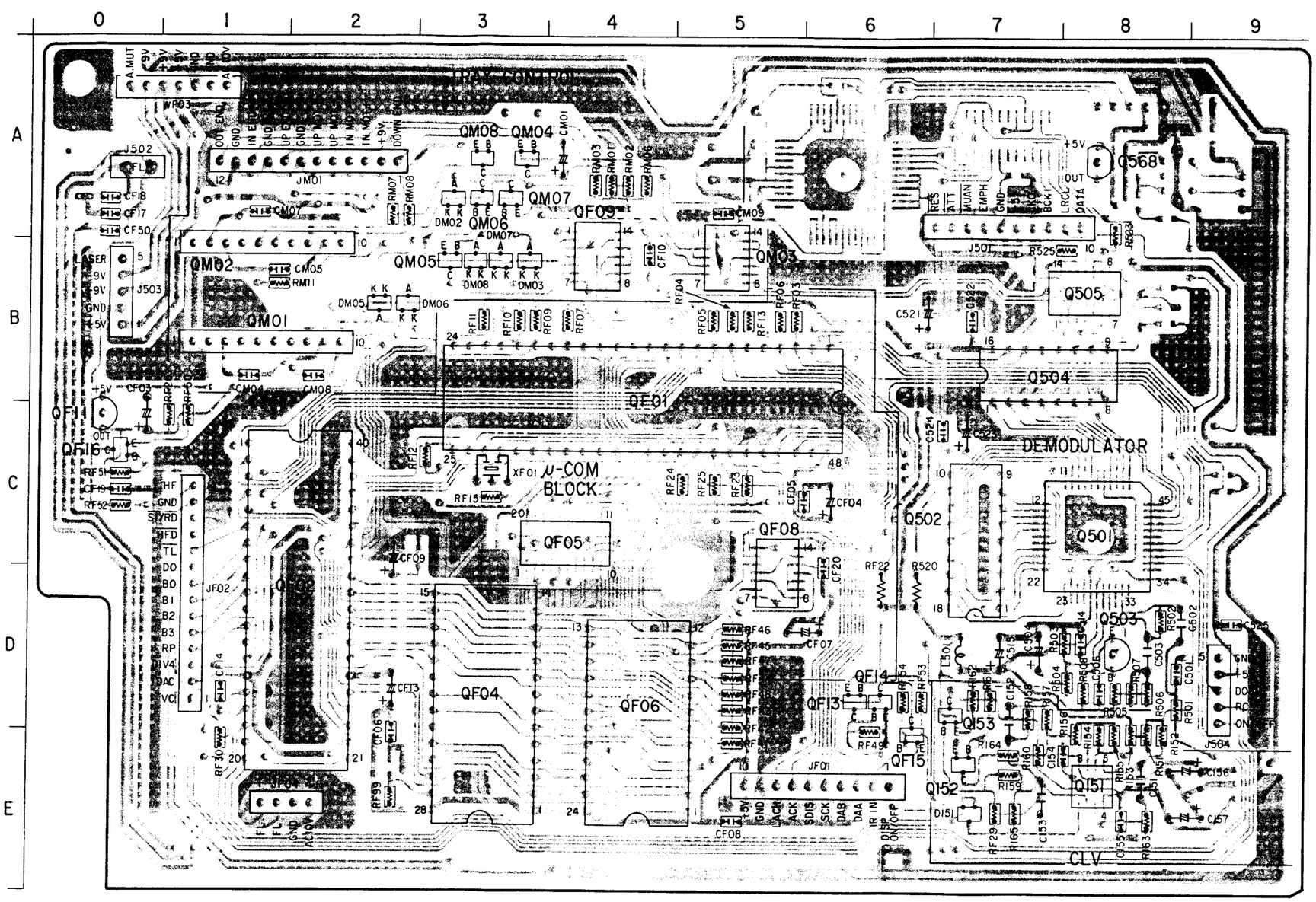

TO SERVO CIRCUIT
Vc
Vc
⊥
-2
+2

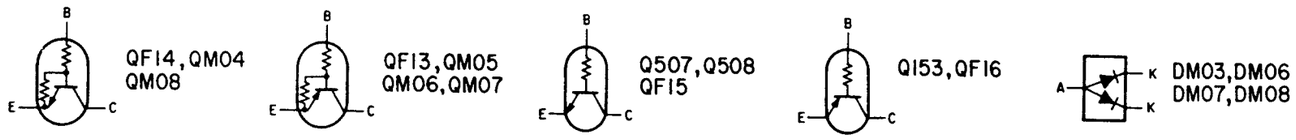

PU16 CONTROL/DECODER
Q502 MBB1416C-15 RAM
Q501 SAA7310 DECODER
Q503 2SA1005 L/K
Q504 PCF3523
Q151
TURNTABLE MOTOR CIRCUIT
Q151 NJM4560M
Q152 2SA1162
Q153 DTA144TK
QF01 MC68HC11A0P MASTER μP
QF02 MC68HC24
QF11 PST523D
QF16 DTA114YK
TO SERVO PV16(J104)
TO SERVO PV16(J103)
TO FRONT PY16(JY01)


Q504 PCF3523
Q505 74HC08
QM03 74HC00F
QM05 DTA114EK
QM08 DTC144EK
QM04 DTC144EK
QM07 DTA114EK DOWN
QM06 DTA114EK UP
QM02 LB1645N CLAMPER UP/DOWN
QM01 LB1645N TRAY IN/OUT
Q568 PST529
QF11 PST523D
QF01 MC68HC11A0P MASTER µP
QF05 74HC373F
QF06 MSM2816A
QF04 M27128A-2F1
QF08,QF09 74HC00F
QF09 (1/4)
QF09 (2/4)
QF09 (3/4)
QF09 (4/4)
QF08 (3/4)
QF08 (2/4)
QF08 (1/4)
QF08 (4/4)
QF13 DTA114EK
QF14 DTC114EK
QF15 DTC114YK
TO DACK PD16(W501)
TO DIGITAL PB16(JT01)
FROM POWER PP16(J803)
TO FRONT PY16(JY02)
FROM TRANSFORMER L001
TRAY SENSOR SW
LASER (+9V) TO J503
SD03 DOWN-END SW
SD04 UP-END SW
SD01 IN-END SW
SD02 OUT-END SW
M002 DRAWER-DRIVER MOTOR
M003 CLAMPER-DRIVER MOTOR
INPUT LOGIC CIRCUIT
PRE-DRIVER
CLOCK GENERATOR
DATA FORMATTER
MODULATOR
C-BIT PROCESSOR
U-BIT PROCESSOR
SUBCODE RECEIVER
I/O PORT A
I/O PORT C
I/O PORT D
OUTPUT PORT B
INPUT PORT E
MODE CONTROL CLOCK & TIMING
ROM 8K BYTES
RAM 256 BYTES
EEPROM 512 BYTES
CPU
LOGIC CONTROL
I/O BUFFERS
65536 BIT CELL MATRIX
X DECODER
Y DECODER
Y GATING
X BUFFERS LATCHES AND DECODER
Y BUFFERS LATCHES AND DECODER
CONTROL LOGIC
16384 BIT E² PROM ARRAY
I/O BUFFERS AND LATCHES
QM01
PIN No. / MODE | 5 | 6 | 2 | 10
OUT | 5V | 0V | 7.3V | 0V
IN | 0V | 5V | 0V | 7.3V
STOP | 5V | 5V | 0.5V | 0.5V
QM02
PIN No. / MODE | 5 | 6 | 2 | 10
UP | 0V | 5V | 0V | 7.3V
DOWN | 5V | 0V | 7.3V | 0V
STOP | 5V | 5V | 0.5V | 0.5V

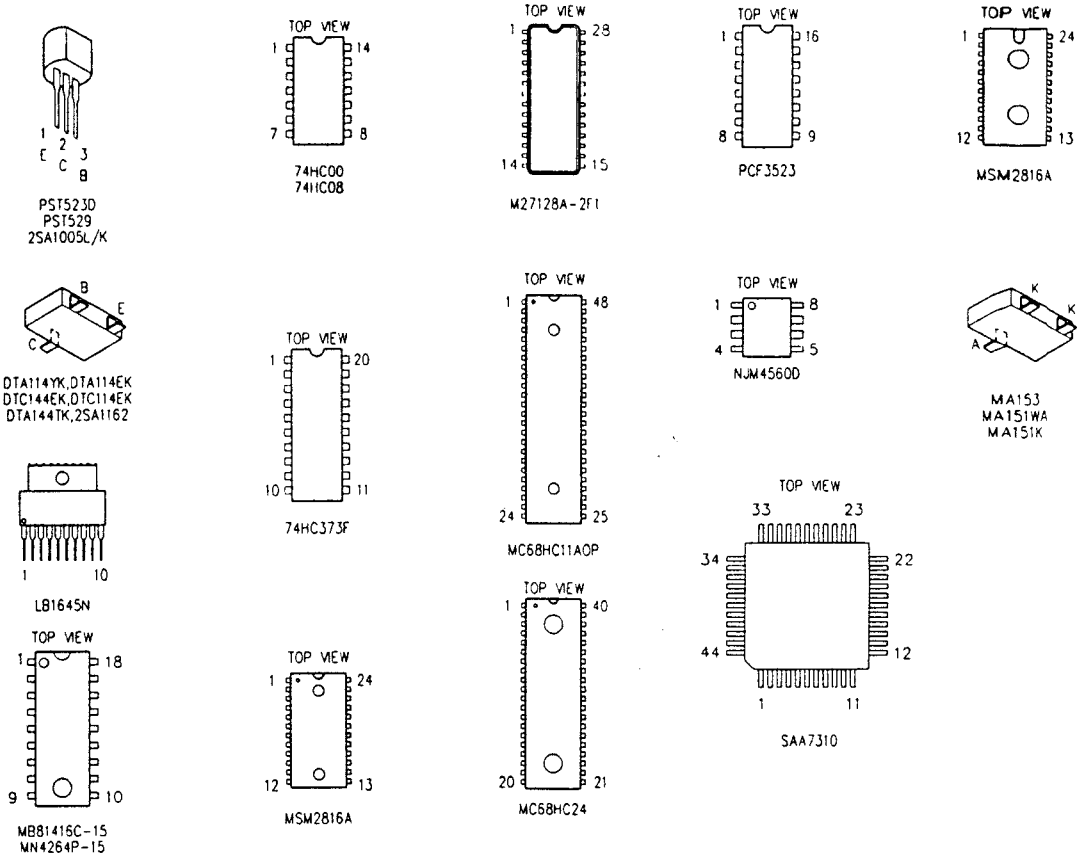

18 LOW PULSES DURING NEXT AND PREVIOUS
53 ACTIVITY WHEN USING AN IR REMOTE CONTROL
57 0.5µs DIV
EYEPATTERN
2.5V
58 10ms DIV
QRA
PLAY POSITION
ASYNCHRONOUS µP DEPENDENT
59 0.2ms DIV
QCL
10+8BITS
60
QDA
DATA
66 PULSES WHEN THE DISC IS SLOWLY BRAKED BY HAND
67 5µs/DIV
136µs
68 ACTIVITY DURING PLAY
69 AUDIO SIGNALS DISC HIGH ON TRACK 1,3,5,7,9,11,13,15,17,19,21,23
LOW ON TRACK 2,4,6,8,10,12,14,16,18,20,22,24
72 5µs DIV
MC SIGNAL
0V
STAND BY POSITION
BEGINNING PLAY POSITION
PLAY POSITION
77 11.2896 MHz SINEWAVE
78 5µs DIV
PLAY POSITION
WSAB
CLAB
111.8µs
81 ACTIVITY DURING PLAY
82 0 V FOR 12 cm DISC
5 V FOR 8 cm DISC
83 1 V AT BEGINNING OF DISC
0.6 V AT END OF DISC

PU16 CONTROL/DECODER (COMPONENT SIDE)

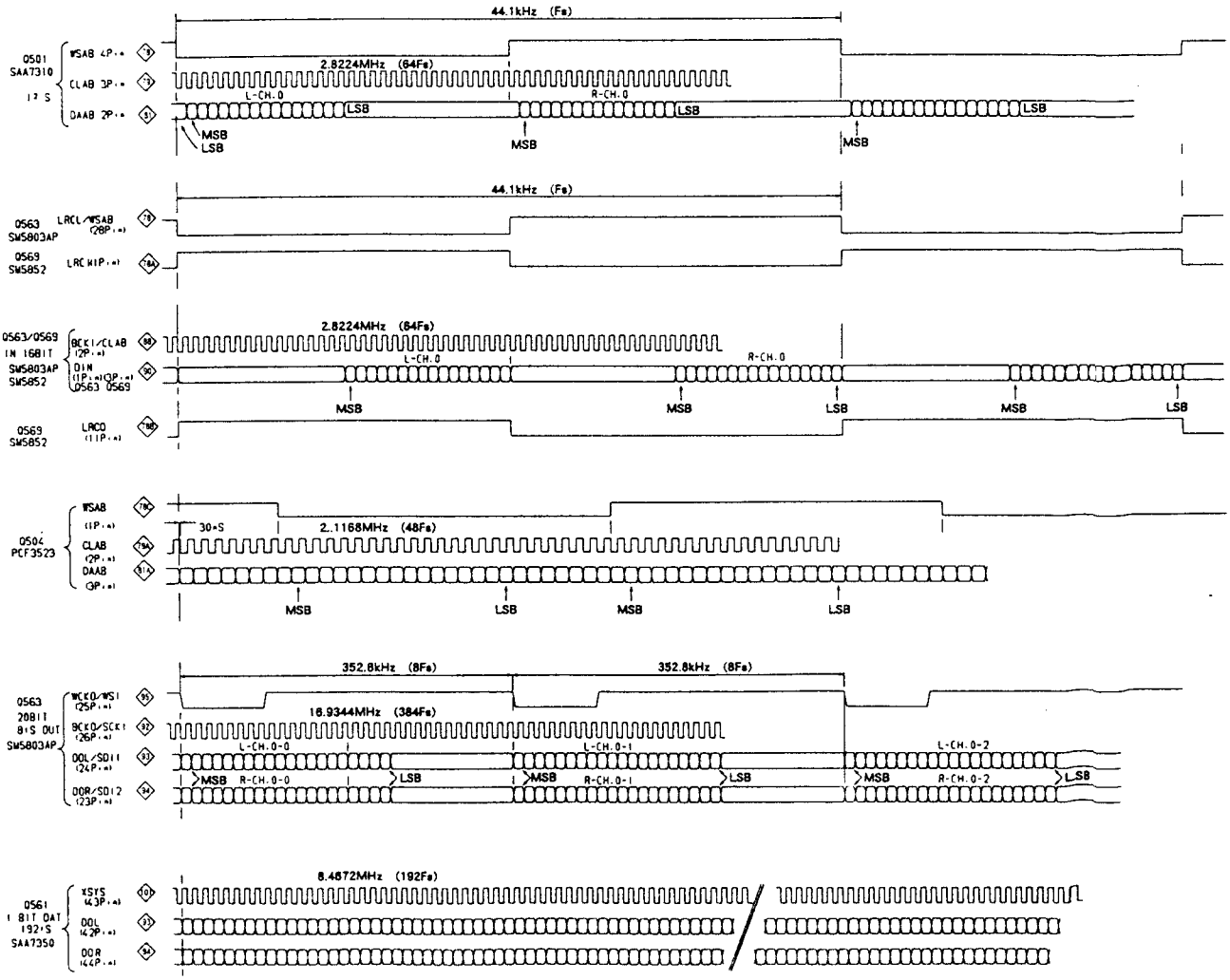

0 1 2 3 4 5 6 7 8 9
A B C D E
TRAY CONTROL
QM08 QM04 QM07 QM06 QM05 QM02 QM01 QM03
QF09 QF01 QF16 QF05 QF08 QF04 QF06 QF14 QF13 QF15
μ-COM BLOCK
DEMODULATOR
Q568 Q505 Q504 Q502 Q501 Q503 Q53 Q152 Q151
J502 J503 J504 JM01 JF01 JF02 J501 J504
CLV

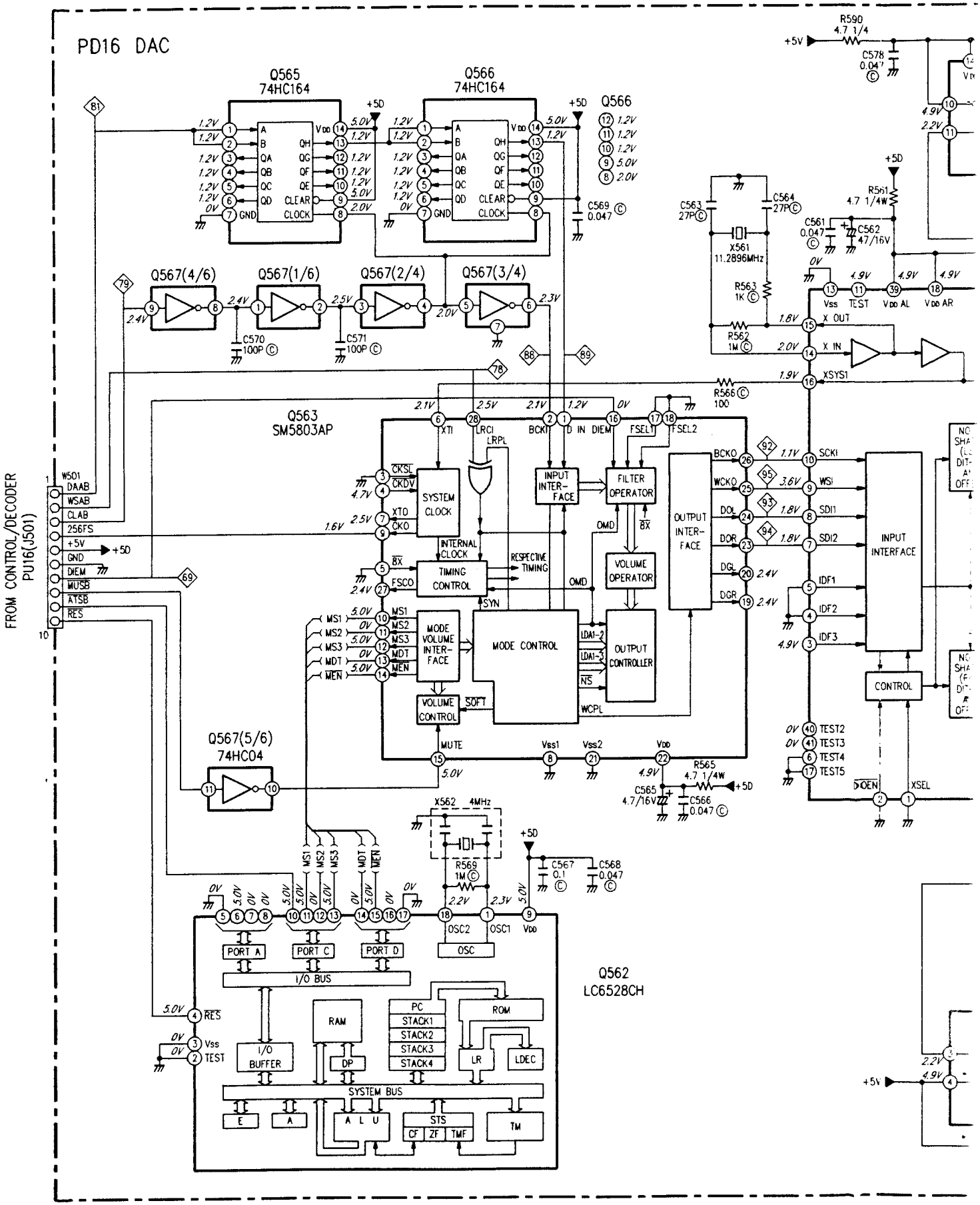


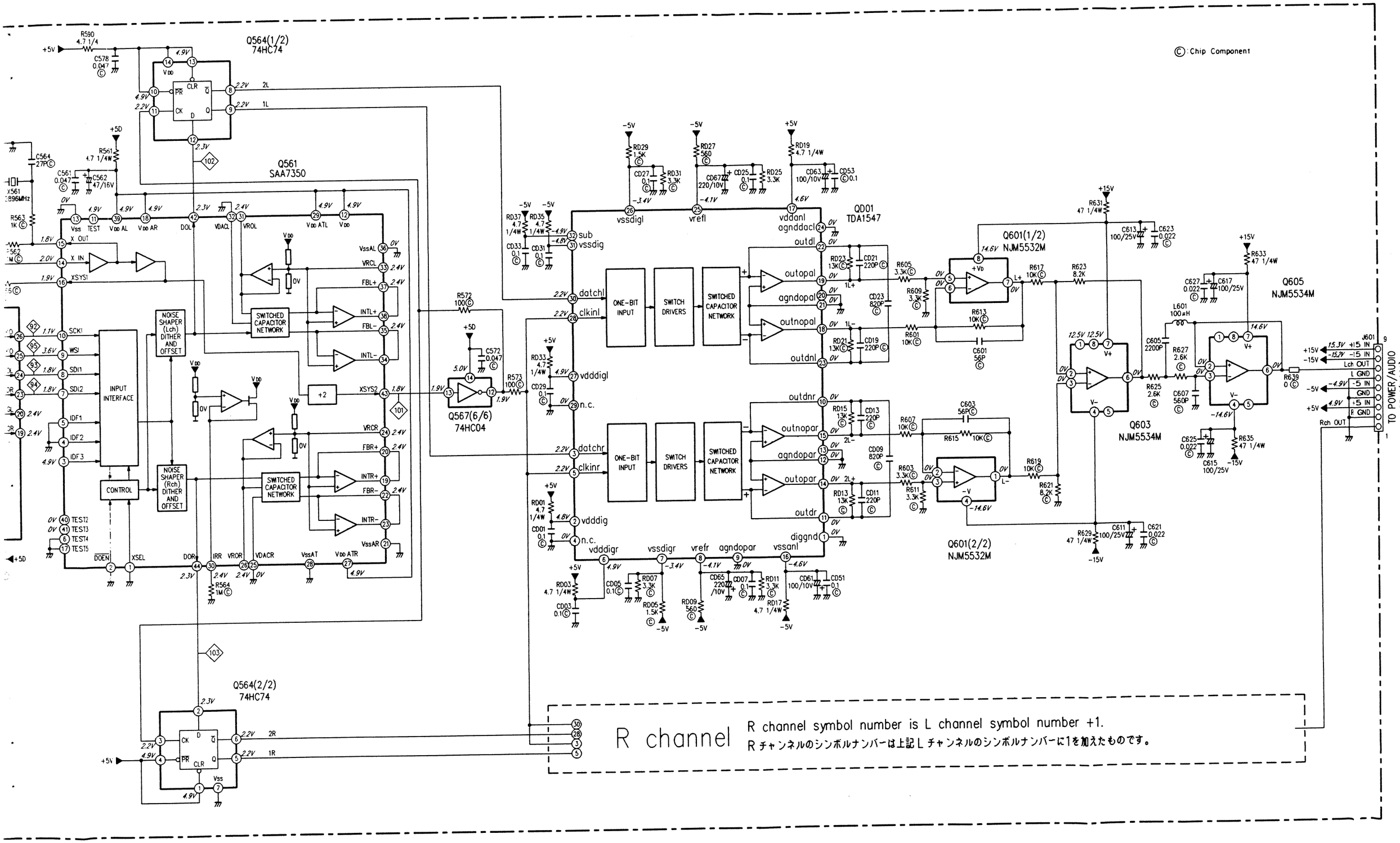
CF03	C0	QF15	E6	R158	D7
CF04	C6	QF16	C0	R159	E7
CF05	C5	QM01	B1	R160	E7
CF06	E2	QM02	B1	R161	D7
CF07	D5	QM03	B5	R162	D7
CF08	E5	QM04	A3	R163	E8
CF09	C2	QM05	B3	R164	E7
CF10	B4	QM06	A3	R165	E7
CF13	D2	QM07	A3	R501	D8
CF14	D1	QM08	A3	R502	D8
CF17	A0	Q151	E8	R503	D8
CF18	A0	Q152	E7	R504	D8
CF19	C0	Q153	D7	R505	D8
CF20	D6	Q501	C8	R506	D8
CF50	A0	Q502	C7	R507	D8
CM01	A4	Q503	D8	R508	D8
CM04	B1	Q504	B7	R520	D6
CM05	B1	Q505	B8	R523	A8
CM07	A1	Q568	A8	R525	B8
CM08	B2	RF03	B5	XF01	C3
CM09	A5	RF04	B5		
C151	E8	RF05	B5		
C152	D7	RF06	B5		
C153	E7	RF07	B4		
C154	E8	RF09	B3		
C155	E8	RF10	B3		
C156	E9	RF11	B3		
C157	E9	RF12	C3		
C501	D8	RF13	B5		
C502	D8	RF15	C3		
C503	D8	RF22	D6		
C504	D7	RF23	C5		
C506	D8	RF24	C5		
C514	D8	RF25	C5		
C515	D7	RF26	C1		
C521	B6	RF29	E7		
C522	B7	RF30	E1		
C523	C7	RF41	E5		
C524	C7	RF42	D5		
C525	D9	RF43	D5		
DM02	A3	RF44	D5		
DM03	B3	RF45	D5		
DM05	B2	RF46	D5		
DM06	B2	RF47	D5		
DM07	B3	RF48	D5		
DM08	B3	RF49	E6		
D151	E7	RF50	C1		
JF01	E6	RF51	C0		
JF02	D1	RF52	C0		
JF04	E1	RF53	D6		
JM01	A2	RF54	D6		
J501	A7	RF99	E2		
J502	A0	RM01	A4		
J503	B0	RM02	A4		
J504	D9	RM03	A4		
L501	D7	RM06	A4		
QF01	B4	RM07	A2		
QF02	D2	RM08	A2		
QF04	D3	RM11	B1		
QF05	C4	R151	E8		
QF06	D4	R152	E8		
QF08	C5	R153	E8		
QF09	B4	R154	E8		
QF11	C0	R155	E8		
QF13	D6	R156	E8		
QF14	D6	R157	D7		



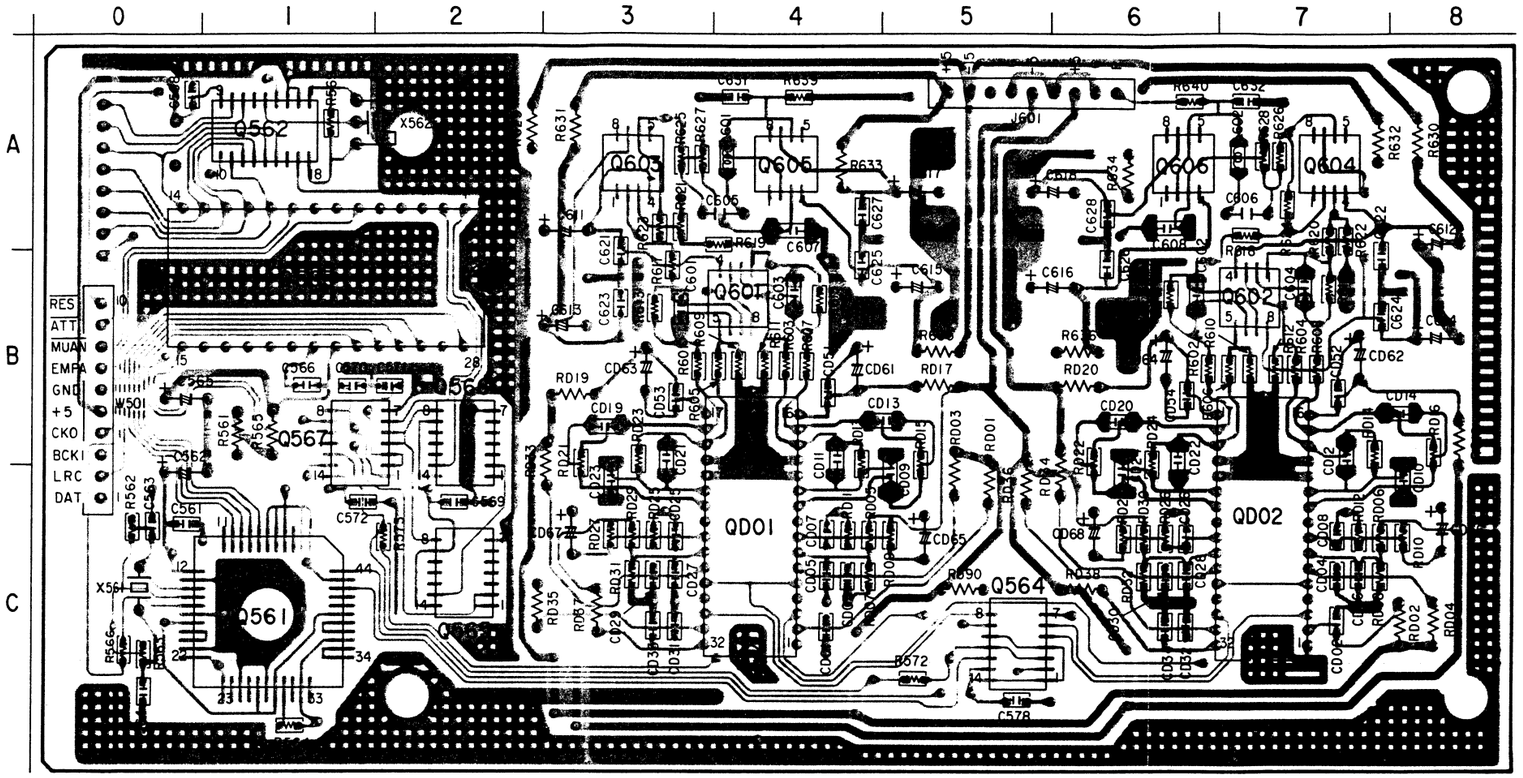
TIMING CHART

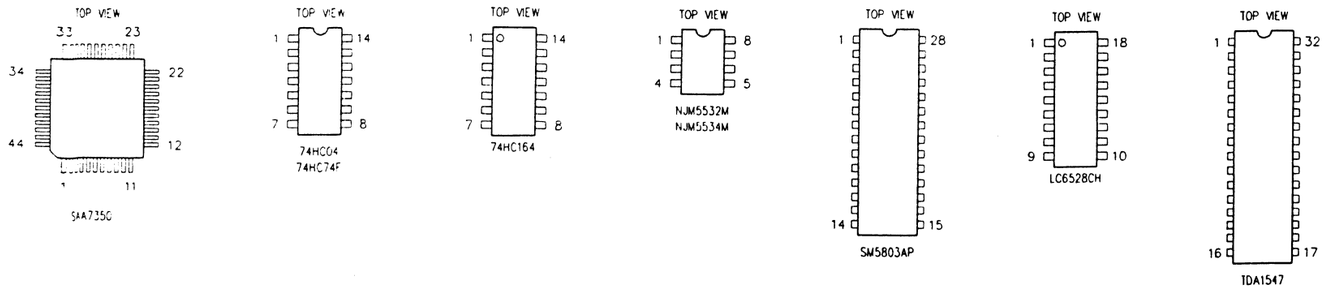



PD16 DAC
Q565
74HC164
Q566
74HC164
Q566
Q567(4/6)
Q567(1/6)
Q567(2/4)
Q567(3/4)
C570
100P
C571
100P
C569
0.047
R590
4.7 1/4
C578
0.047
C563
27P
C564
27P
X561
11.2896MHz
C561
0.047
C562
47/16V
R561
4.7 1/4W
R563
1K
R562
1M
X OUT
X IN
XSYS1
R566
100
Q563
SM5803AP
XTI
LRCI
LRPL
BCKI
D IN
DIEM
FSEL1
FSEL2
SYSTEM CLOCK
INPUT INTER-FACE
FILTER OPERATOR
VOLUME OPERATOR
OUTPUT INTER-FACE
TIMING CONTROL
INTERNAL CLOCK
RESPECTIVE TIMING
MODE VOLUME INTER-FACE
MODE CONTROL
OUTPUT CONTROLLER
VOLUME CONTROL
SOFT
MUTE
BCKO
WCKO
DOL
DOR
DGL
DGR
SCKI
WSI
SDI1
SDI2
IDF1
IDF2
IDF3
INPUT INTERFACE
CONTROL
TEST2
TEST3
TEST4
TEST5
DOEN
XSEL
FROM CONTROL/DECODER PU16(J501)
W501
DAAB
WSAB
CLAB
256FS
+5V
GND
DIEM
MUSB
ATSB
RES
Q567(5/6)
74HC04
X562 4MHz
R569
1M
C567
0.1
C568
0.047
C565
4.7/16V
C566
0.047
R565
4.7 1/4W
PORT A
PORT C
PORT D
OSC
I/O BUS
I/O BUFFER
RAM
DP
PC
STACK1
STACK2
STACK3
STACK4
ROM
LR
LDEC
SYSTEM BUS
E
A
A L U
STS
CF
ZF
TMF
TM
Q562
LC6528CH

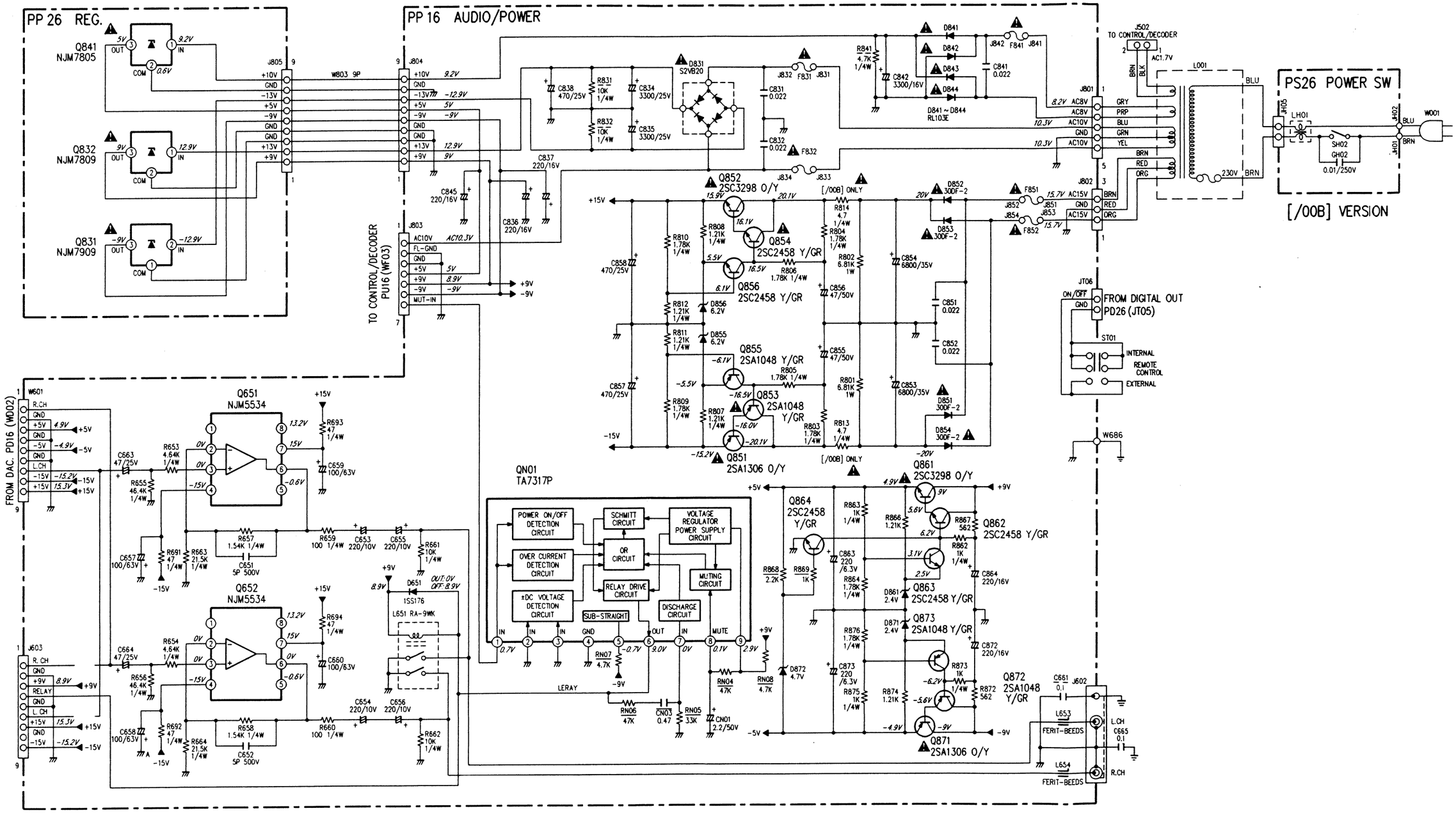

Q564(1/2)
74HC74
Q561
SAA7350
QD01
TDA1547
Q601(1/2)
NJM5532M
Q605
NJM5534M
Q603
NJM5534M
Q601(2/2)
NJM5532M
Q567(6/6)
74HC04
Q564(2/2)
74HC74
SWITCHED CAPACITOR NETWORK
NOISE SHAPER (Lch) DITHER AND OFFSET
NOISE SHAPER (Rch) DITHER AND OFFSET
INPUT INTERFACE
CONTROL
ONE-BIT INPUT
SWITCH DRIVERS
SWITCHED CAPACITOR NETWORK
C : Chip Component
TO POWER/AUDIO PP16(W601)
R channel
R channel symbol number is L channel symbol number +1.
Rチャンネルのシンボルナンバーは上記Lチャンネルのシンボルナンバーに1を加えたものです。

PD16 DAC (COMPONENT SIDE)



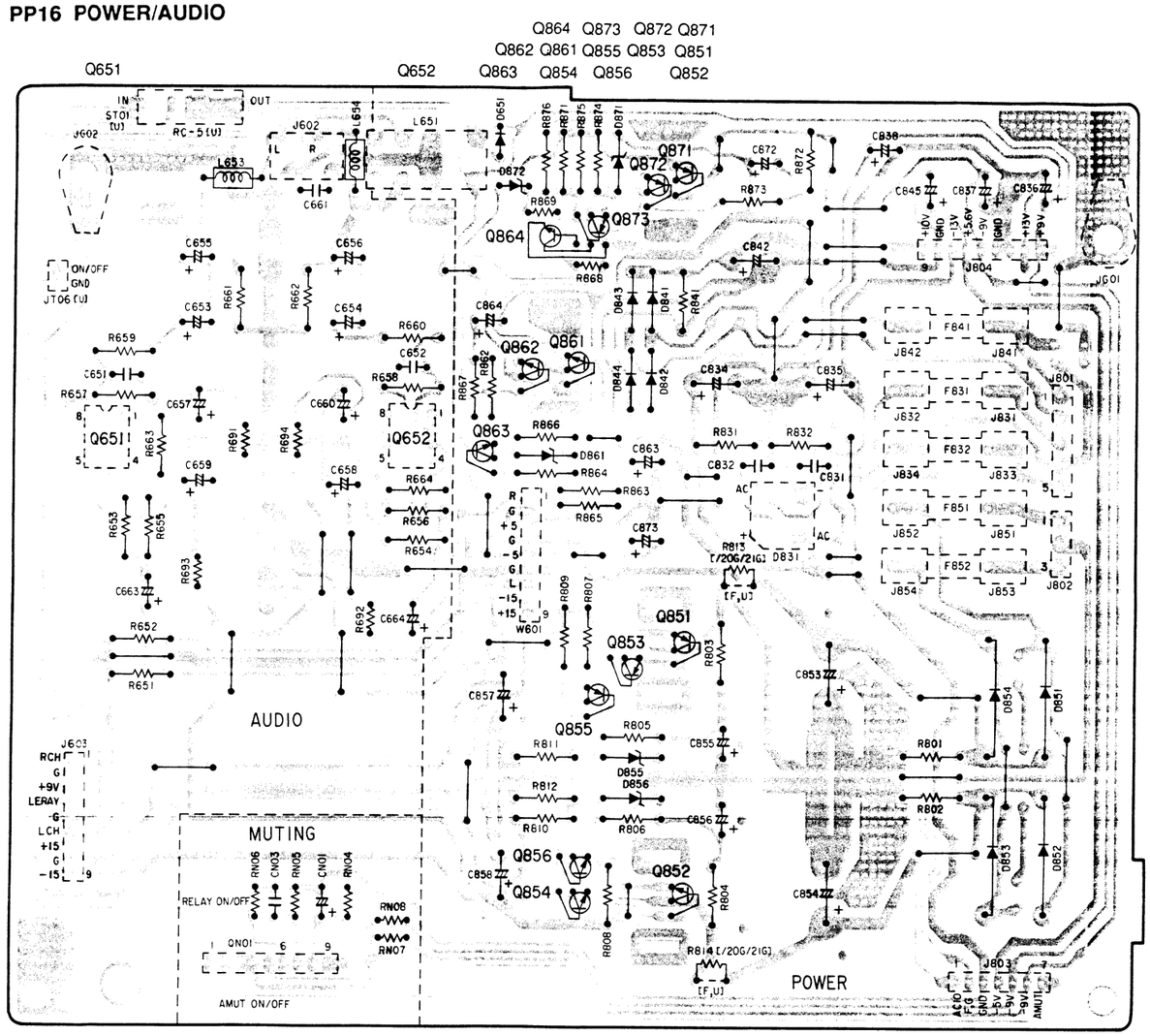


CD01	C4	C611	A3	RD28	C6
CD02	C7	C612	A8	RD29	C3
CD03	C4	C613	B3	RD30	C6
CD04	C7	C614	B8	RD31	C3
CD05	C4	C615	B5	RD32	C6
CD06	C7	C616	B5	RD33	B2
CD07	C4	C617	A5	RD34	B6
CD08	C7	C618	A5	RD35	C2
CD09	B5	C621	A3	RD36	C5
CD10	C8	C622	A7	RD37	C3
CD11	B4	C623	B3	RD38	C6
CD12	B7	C624	B7	R561	B1
CD13	B4	C625	A4	R562	C0
CD14	B8	C626	A6	R563	C0
CD19	B3	C627	A4	R564	C1
CD20	B6	C628	A6	R565	B1
CD21	B3	C631	A4	R566	C0
CD22	B6	C632	A7	R569	A1
CD23	C3	J601	A5	R572	C5
CD24	B6	L601	A4	R573	C2
CD25	C3	L602	A7	R590	C5
CD26	C6	QD01	C4	R601	B3
CD27	C3	QD02	C7	R602	B6
CD28	C6	Q561	C1	R603	B4
CD29	C3	Q562	A1	R604	B7
CD30	C6	Q563	B1	R605	B3
CD31	C3	Q564	C5	R606	B7
CD32	C6	Q565	C2	R607	B4
CD33	C3	Q566	B2	R608	B7
CD34	C6	Q567	B1	R609	B4
CD51	B4	Q601	B4	R610	B7
CD52	B7	Q602	B7	R611	B4
CD53	B3	Q603	A3	R612	B7
CD54	B6	Q604	A7	R613	B3
CD61	B4	Q605	A4	R614	B6
CD62	B7	Q606	A6	R615	B4
CD63	B3	RD01	C5	R616	B7
CD64	B6	RD02	C8	R617	A3
CD65	C5	RD03	B5	R618	A7
CD66	C8	RD04	C8	R619	A3
CD67	C3	RD05	C4	R620	A7
CD68	C6	RD06	C7	R621	A3
C561	C0	RD07	C4	R622	A7
C562	C0	RD08	C7	R623	A3
C563	C0	RD09	C5	R624	A7
C564	C0	RD10	C8	R625	A3
C565	B0	RD11	C4	R626	A7
C566	B1	RD12	C7	R627	A3
C567	A0	RD13	B4	R628	A7
C568	A0	RD14	B7	R629	A2
C569	C2	RD15	B5	R630	A8
C570	B1	RD16	B8	R631	A3
C571	B2	RD17	B5	R632	A7
C572	C1	RD18	B8	R633	A4
C578	C5	RD19	B3	R634	A6
C601	B3	RD20	B6	R635	B5
C602	B6	RD21	B3	R636	B6
C603	B4	RD22	B6	R639	A4
C604	B7	RD23	B3	R640	A6
C605	A3	RD24	B6	W501	B0
C606	A6	RD25	C3	X561	C0
C607	A4	RD26	C6	X562	A1
C608	A6	RD27	C3		

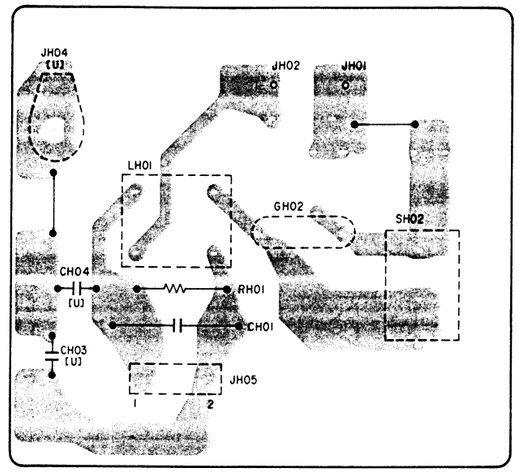


NOTE ON SAFETY:
Symbol ⚠ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol ⚠ . Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.

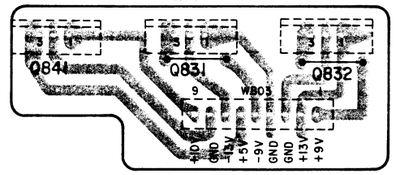
PP16 POWER/AUDIO

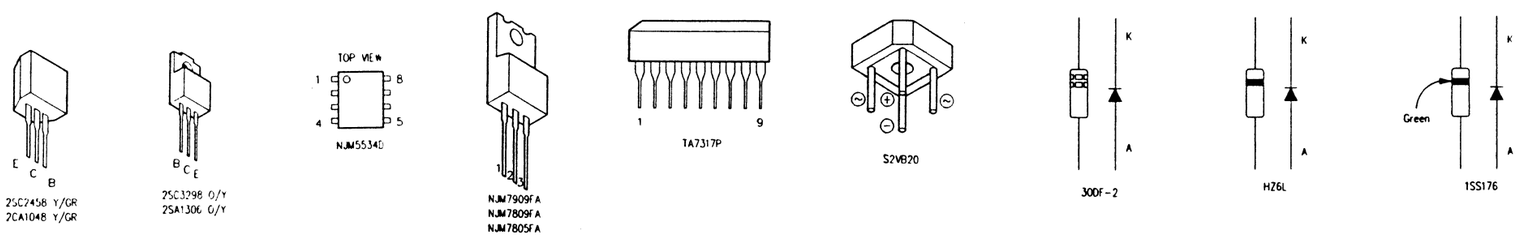


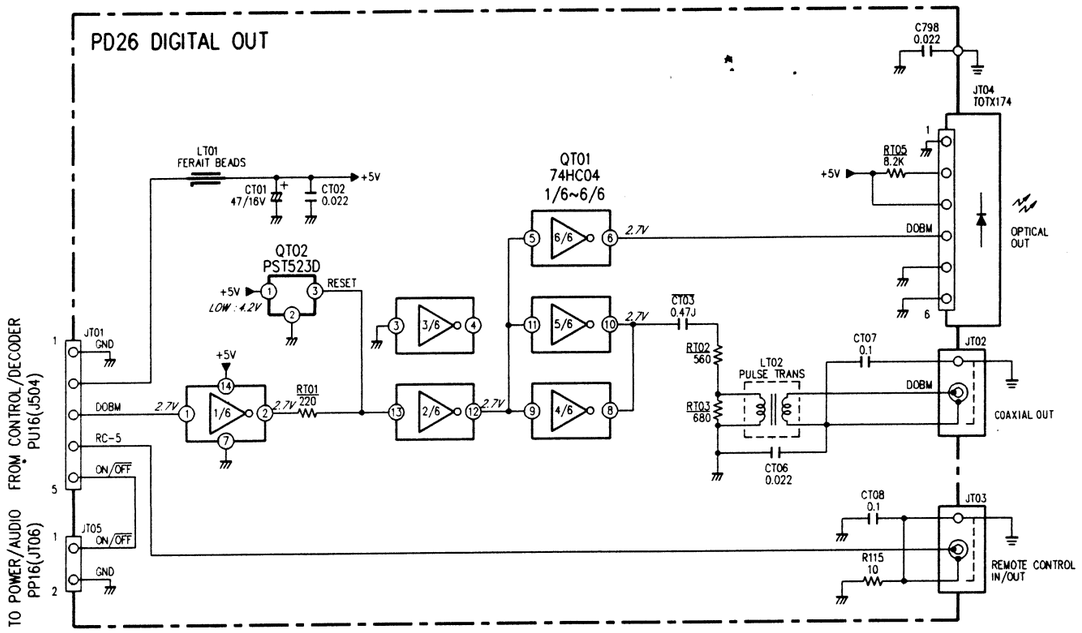
PS26 POWER SW



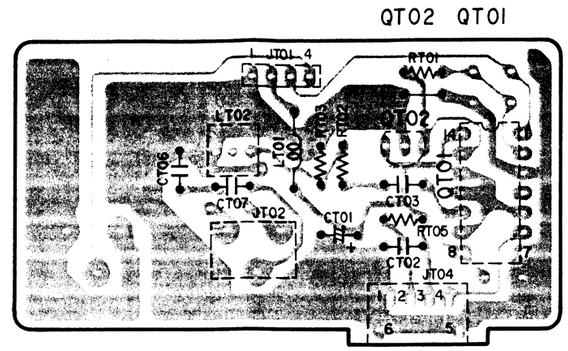
PP26 REGULATOR



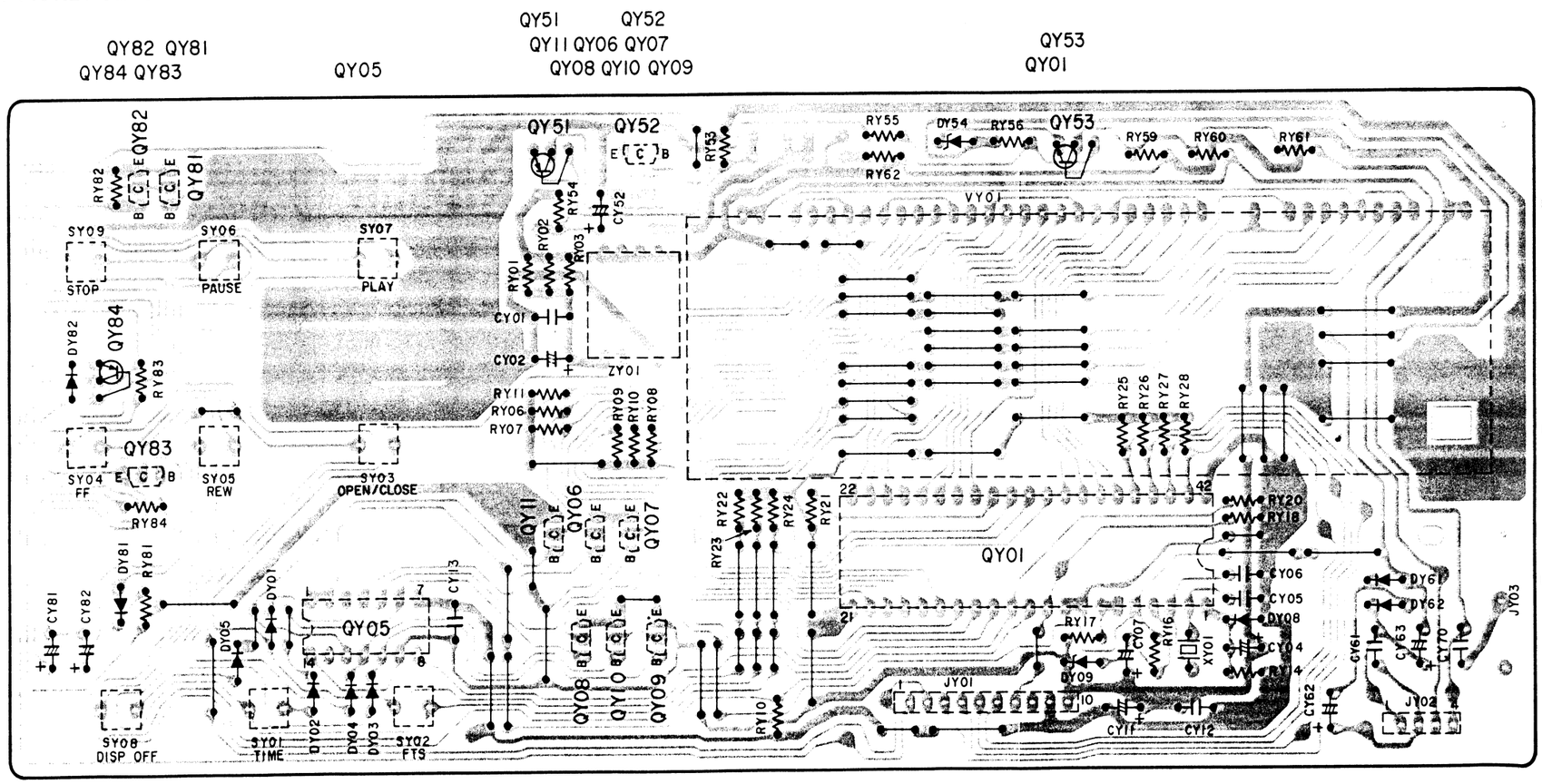


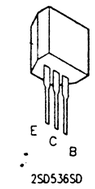


PD26 DIGITAL OUT

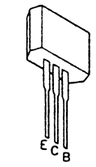


PY16 KEY-SENS/DISPLAY

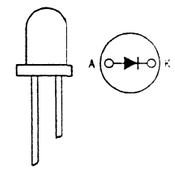




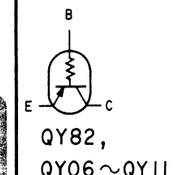
2SD536SD
2SA608SP



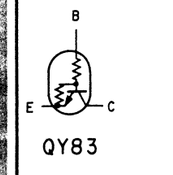
DTA114ES
DTA114TS
DTC114ES



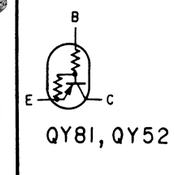
L7088



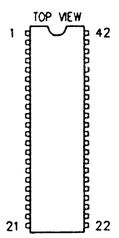
QY82,
QY06～QY11



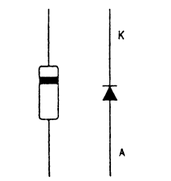
QY83



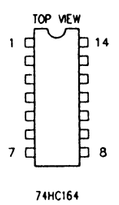
QY81, QY52



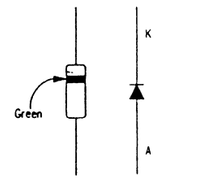
UPD7537A



SS8550



74HC164



151 Z6

PY16 KEY-SENS/
DISPLAY

VY01 FL

DISK
ERROR
SHUFFLE
RECALL
REPEAT
AMS
A◁▷B
TRACK
INDEX
TTL
REMTIME
LAPTIME
MIN
SEC

QY01
μPD7537A

QY06~QY11
DTA114TS

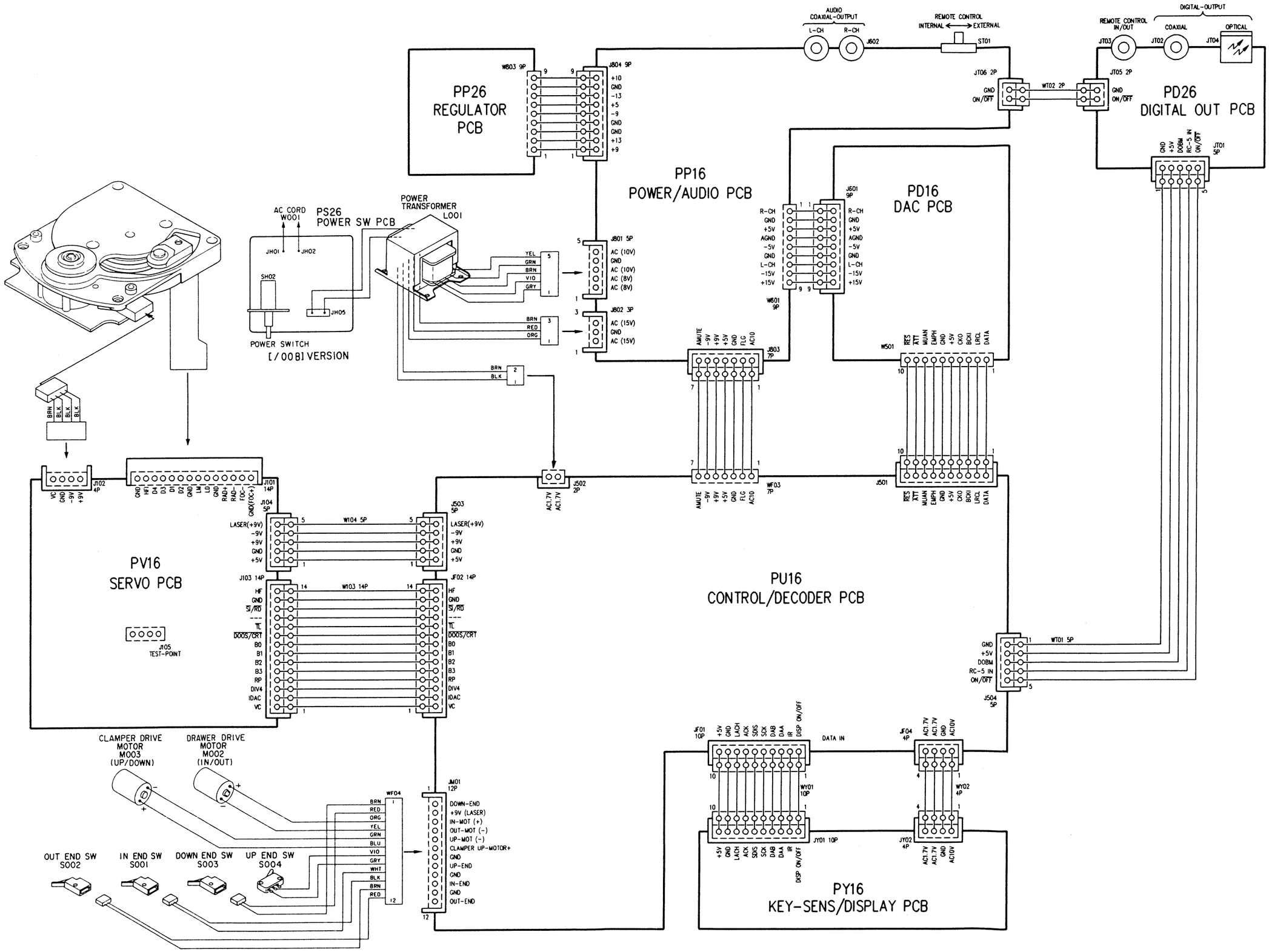
QY05 74HC164
8-BIT SERIAL/PARALLEL
SHIFT REGISTER

128x4 BITS RAM
2048x8 BITS ROM
CPU
CLOCK & TIMING
I/O PORT 1C
OUTPUT PORT 9
OUTPUT PORT 3
OUTPUT PORT 8
I/O PORT 11
I/O PORT 0
I/O PORT 4
OUTPUT PORT 3
I/O PORT 5

SY01 REPEAT
SY02 FTS
SY03 OPEN
SY04 TRACK >>
SY05 TRACK <<
SY06 PAUSE
SY07 PLAY/REPLAY
SY08 DISP
SY09 STOP/CM

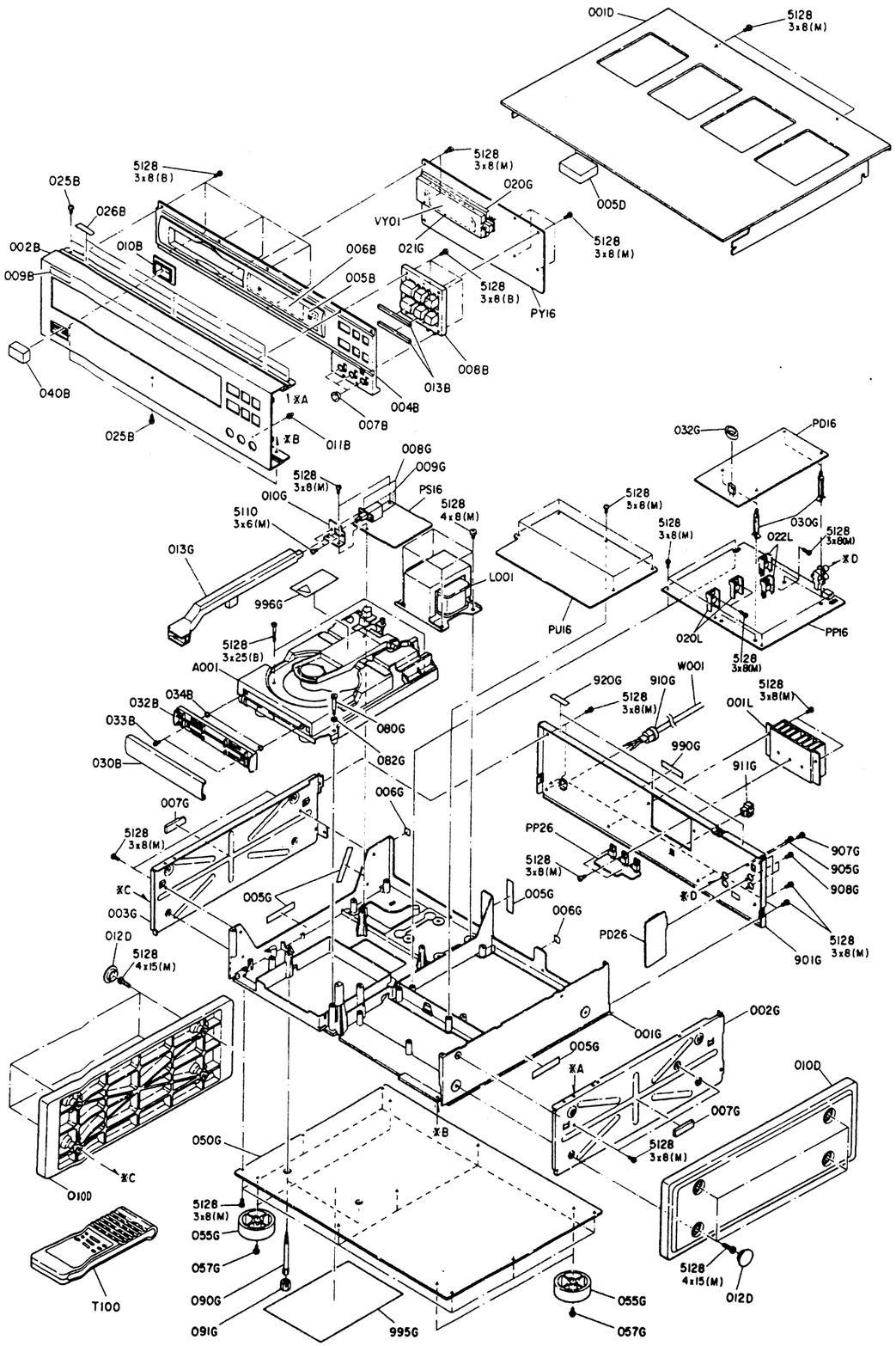
QY51 2SA605SP
QY52 DTC114ES
QY53 2SC536SP
QY81 DTA114ES
QY82 DTA114TS
QY83 DTC114ES
QY84 2SA605SP
ZY01 PAS-C0617

JY01
JY02
CT-OUT

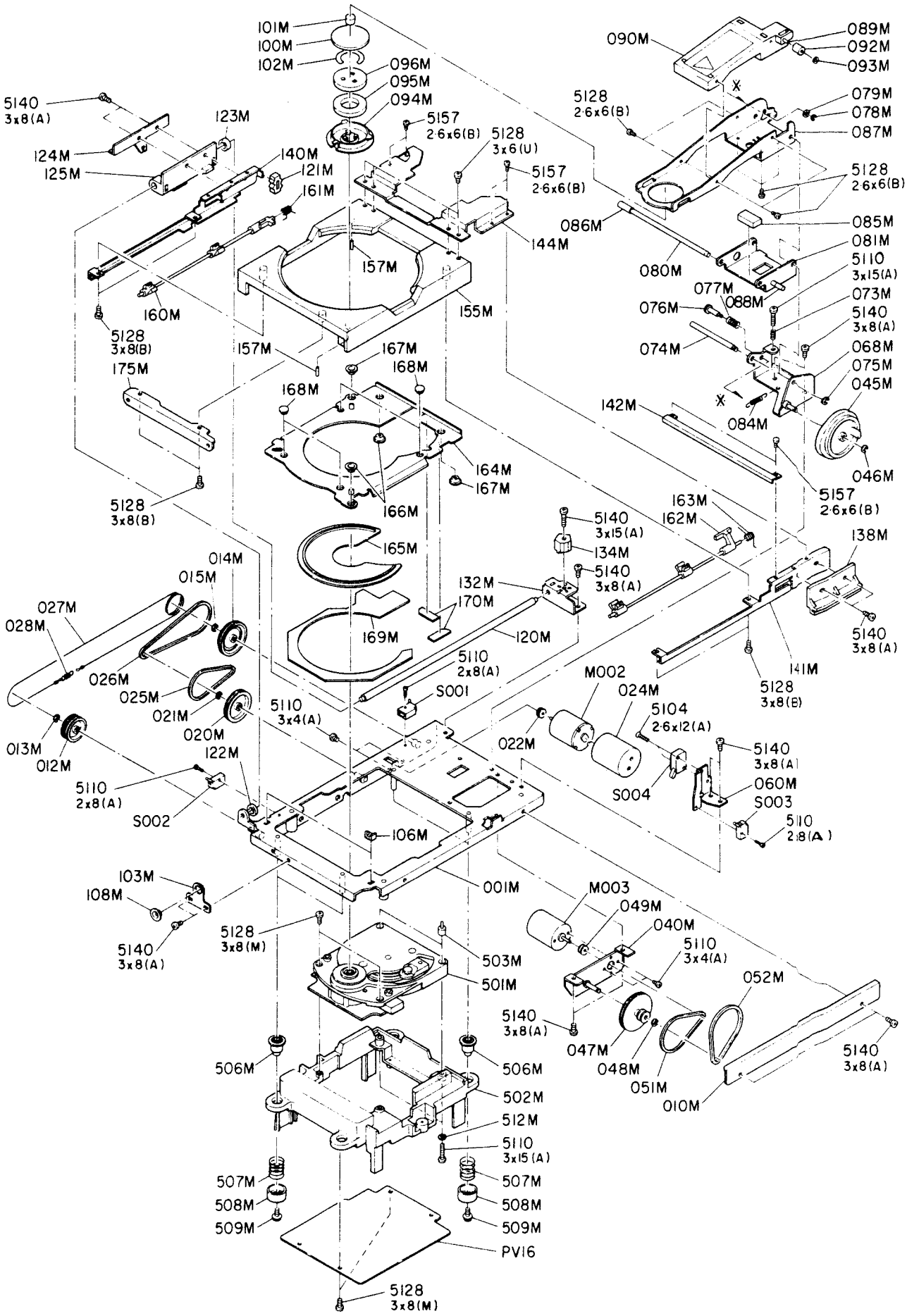

PP26
REGULATOR
PCB
W803 9P
J804 9P
+10
GND
-13
+5
-9
GND
GND
+13
+9
AUDIO
COAXIAL-OUTPUT
L-CH
R-CH
J602
REMOTE CONTROL
INTERNAL ⟷ EXTERNAL
ST01
DIGITAL-OUTPUT
REMOTE CONTROL
IN/OUT
COAXIAL
OPTICAL
JT03
JT02
JT04
JT06 2P
GND
ON/OFF
WT02 2P
JT05 2P
GND
ON/OFF
PD26
DIGITAL OUT PCB
GND
+5V
DOBM
RC-5 IN
ON/OFF
JT01
5P
PP16
POWER/AUDIO PCB
PD16
DAC PCB
AC CORD
W001
PS26
POWER SW PCB
JH01
JH02
SH02
JH05
POWER SWITCH
[/00B] VERSION
POWER
TRANSFORMER
L001
YEL
GRN
BRN
VIO
GRY
J801 5P
AC (10V)
GND
AC (10V)
AC (8V)
AC (8V)
BRN
RED
ORG
J802 3P
AC (15V)
GND
AC (15V)
BRN
BLK
J601
9P
R-CH
GND
+5V
AGND
-5V
GND
L-CH
-15V
+15V
W601
9P
AMUTE
-9V
+9V
+5V
GND
FLG
ACTO
J803
7P
W501
RES
ATT
MUAN
EMPH
GND
+5V
CKO
BCKI
LRCL
DATA
BRN
BLK
BLK
BLK
J102
4P
VC
GND
-9V
+9V
J101
14P
GND
HF
DA
D3
D2
GND
LM
LD
GND
RAD+
RAD-
FOC-
GND(FOC+)
J104
5P
J503
5P
LASER(+9V)
-9V
+9V
GND
+5V
W104 5P
PV16
SERVO PCB
J103 14P
HF
GND
SI/RO

TE
DOOS/CRT
B0
B1
B2
B3
RP
DIV4
IDAC
VC
W103 14P
JF02 14P
J105
TEST-POINT
J502
2P
AC1.7V
AC1.7V
WF03
7P
J501
PU16
CONTROL/DECODER PCB
W701 5P
J504
5P
CLAMPER DRIVE
MOTOR
M003
(UP/DOWN)
DRAWER DRIVE
MOTOR
M002
(IN/OUT)
WF04
BRN
RED
ORG
YEL
GRN
BLU
VIO
GRY
WHT
BLK
BRN
RED
JM01
12P
DOWN-END
+9V (LASER)
IN-MOT (+)
OUT-MOT (-)
UP-MOT (-)
CLAMPER UP-MOTOR+
GND
UP-END
GND
IN-END
GND
OUT-END
OUT END SW
S002
IN END SW
S001
DOWN END SW
S003
UP END SW
S004
JF01
10P
DISP ON/OFF
IR
DAB
DAA
SCK
SDIS
ACK
LACH
GND
+5V
DATA IN
JF04
4P
AC1.7V
AC1.7V
GND
AC10V
WY01
10P
WY02
4P
JY01 10P
JY02
4P
PY16
KEY-SENS/DISPLAY PCB

6 EXPLODED VIEW AND MECHANICAL PARTS LIST



REF. DESIG.	PART NO.	DESCRIPTION
002B	4822 444 40652	FRONT PANEL
004B	4822 454 30482	ESCUTCHEON
005B	4822 450 62029	WINDOW
006B	4822 459 40729	FL-MASK (BLUE)
007B	4822 410 62505	BUTTON, FTS/REPEAT/D-OFF
008B	4822 410 62506	BUTTON
009B	4822 459 10943	BADGE
010B	4822 532 70319	BUSHING, POWER SW
011B	4822 381 11393	LENS, DISPLAY OFF
025B	4822 502 13636	PH.TAP.SCREW
030B	4822 454 30483	ESCUTCHEON
032B	4822 532 40218	RETAINER
033B	4822 502 13927	F.WASHER SCREW
040B	4822 410 61556	BUTTON POWER
010D	4822 444 40651	SIDE PANEL
012D	4822 443 62664	CAP, SIDE PANEL
013G	4822 402 61411	LINK, POWER SW
020G	4822 256 92037	HOLDER FL
021G	4822 459 10942	STICKER
055G	4822 462 41947	LEG
057G	4822 502 12511	B.T.SCREW(W/W)
080G	4822 502 13925	SCREW
082G	4822 530 80667	WAVE WASHER
090G	4822 532 30508	SHAFT
091G	4822 462 71495	CAP
905G	4822 502 13636	PH.TAP.SCREW
907G	4822 502 13636	PH.TAP.SCREW
908G	4822 502 13636	PH.TAP.SCREW
910G	4822 325 50202	BUSHING, AC CORD
L001	4822 146 21721	POWER TRANSFORMER [/00B]
VY01	4822 130 90441	DISPLAY UNIT
W001	4822 321 10804	A.C.POWER CORD
W100	4822 321 61923	CONNECTIVE CORD (FOR SUB CHASSIS)
		PACKING
J082	4822 321 22611	CONNECTIVE CORD, RCA AUDIO
J083	4822 321 22862	CONNECTIVE CORD, RCA GOLD 75Ω DIGITAL
T100	4822 218 10507	IR COMANDER (RC-10CD)
001T	4822 736 21677	USER MANUAL


101M
100M
102M
096M
095M
094M
5157 2·6x6(B)
5128 3x6(U)
5157 2·6x6(B)
144M
157M
155M
5140 3x8(A)
123M
124M
125M
140M
121M
161M
160M
5128 3x8(B)
157M
167M
168M
175M
168M
164M
167M
166M
5128 3x8(B)
165M
169M
014M
015M
027M
028M
026M
025M
021M
020M
013M
012M
5110 2x8(A)
S002
122M
5110 3x4(A)
132M
170M
120M
5110 2x8(A)
S001
106M
001M
103M
108M
5140 3x8(A)
5128 3x8(M)
503M
501M
506M
506M
502M
512M
5110 3x15(A)
507M
508M
509M
507M
508M
509M
PV16
5128 3x8(M)
090M
089M
092M
093M
5128 2·6x6(B)
079M
078M
087M
5128 2·6x6(B)
086M
085M
081M
080M
5110 3x15(A)
077M
088M
076M
073M
5140 3x8(A)
074M
068M
075M
045M
142M
084M
046M
5157 2·6x6(B)
163M
162M
5140 3x15(A)
134M
5140 3x8(A)
138M
5140 3x8(A)
141M
5128 3x8(B)
M002
024M
5104 2·6x12(A)
022M
S004
5140 3x8(A)
060M
S003
5110 2·8(A)
M003
049M
040M
5110 3x4(A)
052M
5140 3x8(A)
047M
048M
051M
010M
5140 3x8(A)

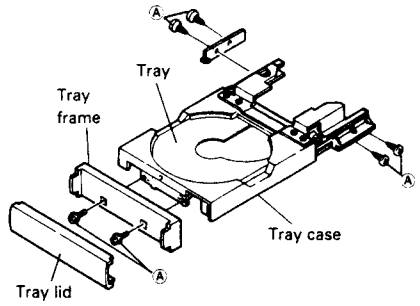
REF. DESIG.	PART NO.	DESCRIPTION
012M	4822 528 81163	PULLEY
013M	4822 530 70043	E RING
014M	4822 528 81387	PULLEY
015M	4822 530 70043	E RING
020M	4822 528 81238	PULLEY
021M	4822 530 70043	E RING
022M	4822 528 81166	PULLEY, MOTOR
025M	4822 358 30762	BELT, MOTOR
026M	4822 358 31065	BELT, TRAY DRIVE
028M	4822 492 33161	SPRING, TENSION
045M	4822 528 30392	CAM, CLAMPER
046M	4822 530 70043	E RING
047M	4822 528 81164	PULLEY, CLAMPER MIDDLE
048M	4822 530 70043	E RING
049M	4822 528 81166	PULLEY, MOTOR
051M	4822 358 30762	BELT, MOTOR
052M	4822 358 30763	BELT, CAM DRIVE
073M	4822 492 70628	SPRING, DOWN ADJUSTER
075M	4822 530 70043	E RING
077M	4822 492 70631	SPRING, L/R ADJUSTER
078M	4822 530 70122	E RING
079M	4822 532 52236	WASHER
084M	4822 492 70629	SPRING, CLAMPER PULL DOWN
088M	4822 528 90837	ROLLER
092M	4822 528 90836	ROLLER
093M	4822 532 51467	STOPPER
094M	4822 526 20174	CLAMPER
095M	4822 526 20173	MAGNET
096M	4822 528 90783	COVER
100M	4822 462 71811	BUFFER, CLAMPER
101M	4822 462 71809	BUFFER, CLAMPER TOP
102M	4822 466 61927	BUFFER, CLAMPER TOP
106M	4822 256 91867	HOLDER, TRAY FRONT SUPPORT
108M	4822 532 30509	BUSHING, FRONT GUIDE
125M	4822 256 91196	HOLDER, SLIDE BEARING
155M	4822 444 50574	CASE, TRAY
161M	4822 492 70633	SPRING, TRAY LIFT LEFT
163M	4822 492 70632	SPRING, TRAY LIFT RIGHT
164M	4822 444 50635	TRAY, U/D DISC
165M	4822 444 50677	TRAY, SINGLE
501M	4822 691 30276	MECHANISM CDM-4
502M	4822 444 60906	CASE, MECHA
506M	4822 532 21452	BUSHING, SUSPENSION RUBBER
507M	4822 492 70625	SPRING, SUSPENSION
508M	4822 530 70561	RETAINER
509M	4822 502 13926	F.WASHER SCREW
512M	4822 530 80349	SPRING WASHER
M002	4822 361 60467	D.C.MOTOR, TRAY DRIVE
M003	4822 361 60447	D.C.MOTOR, CLAMPER DRIVE
S001	4822 277 21132	SLIDE SWITCH, TRAY IN END
S002	4822 277 21132	SLIDE SWITCH, TRAY OUT END
S003	4822 277 21132	SLIDE SWITCH, CLAMPER DOWN END SENSOR
S004	4822 271 30712	MINI SWITCH, CLAMPER UP END SENSOR

7 TRAY MECHANISM LOADING PROCEDURES

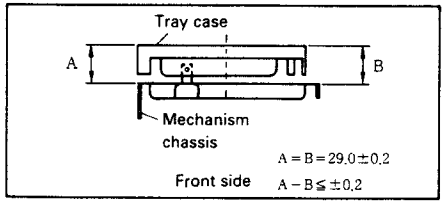
Cautions when servicing

1. When mounting tray and tray case
(when replacing tray case because of damage etc.)

a) When the tray has been positioned improperly with a deviated clearance to the front panel window, remove the tray lid, loosen screws Ⓐ and adjust by moving the tray frame within the range of the holes play.



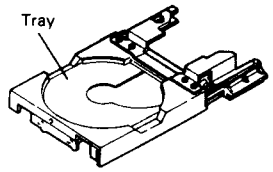
For the tray tilt adjustment, refer to the figure below.



Adjust the tilt with screws Ⓐ.

b) The operating power of the tray is set to 250 - 350gr (Power OFF).

2. When the tray is disengaged to the lower side

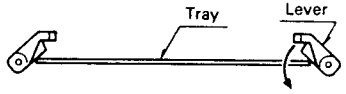


When the tray is pushed downward without the sub-chassis (CDM-4), it will be disengaged. So care will be necessary.

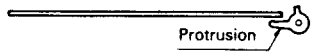
(Closing the tray without the sub-chassis also disengages the tray.)

Mount the tray referring to the figures below.

a) Bring down the lever and put the tray on the protrusion of lever.



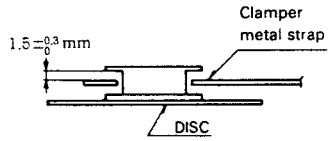
b) While holding the tray, bring down the opposite lever and put the tray on the protrusion of the lever.

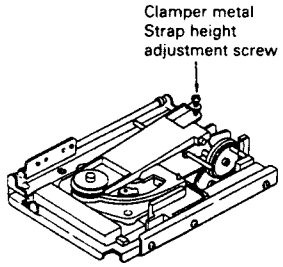


Note:
If both the levers are brought down at the same time, the tray cannot be raised. The levers should be brought down one by one.
If the tray is forced to move to the original position, the two pins injected into the tray case may be bent.

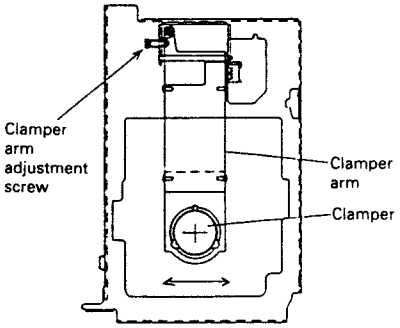
3. When replacing the sub-chassis (CDM-4)

a) The height of the sub-chassis turn table is different one by one. Adjust each turn table height so that the magnet clamper does not touch the clamper metal strap as shown in the figure.
Standard ($1.5 \pm {}^{0.3}_{0}$ mm)



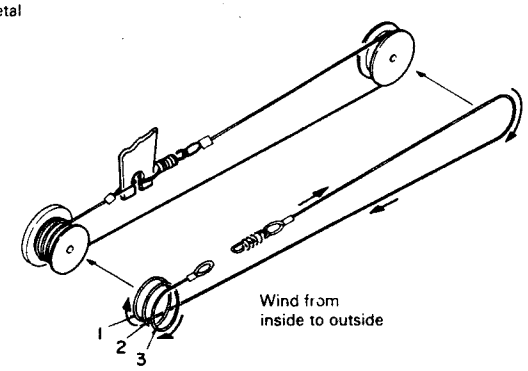


b) After replacing the sub-chassis, readjust so that the magnet clamper does not touch the clamper metal strap at right and left sides. (The clamper metal strap should not be touched to other straps.)

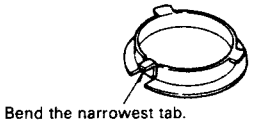


4. Others

a) For the loading wire winding, refer to the figure below.



b) When the magnet clamper (094M) is replaced, bent the narrowest tab and remove the clamper.



8 PRACTICAL HINTS

Test discs

It is important that the test discs be treated with great care. The disturbances on the discs (black spots, finger-prints, etc.) are exclusive and are unambiguously positioned. Damages may cause extra drop-outs etc., thus putting an end to the exclusivity of the intentional error on the disc. In that case it is not possible anymore to check for example the good functioning of the track detector.

Measurements on op-amps

In the electronic circuits, op-amps have frequently been used.
The applications include amplifiers, filters, invertors and buffers.

In those cases where in one way or the other feedback has been applied, the voltage difference at the differential inputs converges to zero.
This applies to both DC and AC signals.
The cause can be traced to the properties of an ideal op-amp (Z=∞, G=∞, ZO=0).
If one input of an op-amp is directly connected to ground, it will be virtually impossible to measure at the inverting and non-inverting inputs.
In such cases only the output signal will be measurable.

That is why in most cases the AC voltage at the inputs will not be given.
The DC voltages at the inputs are equal.

Stimulating with "0" and "1"

To find a location of failure circuit it is sometimes necessary to connect certain points to ground or to a power supply voltage.
As a result certain circuits can be set to a desired state, thus saving the diagnosis time.
Generally, if the points are outputs of op-amps, specified dummies are used to connect the output to the ground.
As a result, the required check can be made with the circuit protected.

Measurements on microprocessors

Inputs and outputs of microprocessors should never be connected directly to the supply voltage.
The inputs and outputs should only be brought to "0" or ground if this is stated explicitly.

Measurements with an oscilloscope

During measurements with an oscilloscope it is recommended to use a 1:10 test probe, since a 1:10 probe has a considerably smaller input capacitance than a 1:1 probe.

Selection of the ground potential

It is very important to select a ground point that is as close as possible to the test point.

Conditions for injection

- Injection of levels or signals from an **external** source should **never** take place if the relevant circuit has no supply voltage.
- The injected levels or signals should **never** be greater than the supply voltage of the relevant circuit.

Indication of the test points

In the drawing of the diagrams and PCBs the test points are indicated by a number (e.g. ◇12◇) to which the measuring method refers.
In the following measuring method the symbol ◇ has been omitted for the test points indicated.

GENERAL CHECK POINTS

In the detailed measuring method below, a number of general conditions, required for a properly functioning set, will not be mentioned.
Before the detailed measuring method is started, these general points should be checked:

a. Ensure that the disc and objective are clean (remove dust, fingerprints, etc.) and use undamaged discs.

b. Check that all supply voltages are present and that they have the correct values.

Initiation of the service programme of the µP

For the initiation of the service programme of the µP, see Initiating the service programme.

SERVICING THE CDM UNIT

If the CDM is malfunction, replace whole, CDM unit.

9 INITIATING THE SERVICE PROGRAMME

The player can be brought in service position "0" to "3" whether the disc is put on the turntable or not. For the service position "2", the disc should be put on the turntable.

Service position "0"

- Press "STOP", "PLAY" and "FTS" simultaneously while switching on the mains voltage.
- The display shows:
  - The TRACK and INDEX field: Cd 10
  - The MINUTES and SECONDS field: 00 0
- Fast CDM check:
  - With SEARCH keys " ◀◀ " and " ▶▶ " (Remote Control only) or with jog dial, check that the radial arm moves most outward and inward. (Service position "0" to "3")
  - Laser control in.
  - Check that the focus unit jumps over the tracks.

ATTENTION:
After the player is brought in service position "0" the laser remains driven until service position "3". Therefore, avoid direct exposure to the beam in service positions "0", "1" and "2".

Service position "1"

- Bring the player in service position "0".
  Press SKIP key " ▶▶| ".
- The display shows:
  - The MINUTES and SECONDS field: 00 1
- Functions:
  - Laser control in.
  - Focus start procedure is repeated unlimitedly. (If not, check SI/$\overline{RD}$ signal.)
  - With SKIP key " ▶▶| ", one can go back to service position "0".

Service position "2"

- Without a disc on the turntable:
  - Bring the player in service position "1" with the power turned off and the disc put on the turntable.
- With a disc on the turntable:
  - With SEARCH key " |◀◀ ", move radial arm most inward.
- Bring the player in service position "1".
- Press SKIP key " ▶▶| ".
- The display shows:
  - The MINUTES and SECONDS field: 00 2
- Functions:
  - Laser control in.
  - Focus control in.
  - Turntable motor control in.
  - Decoder IC generates MC signal.
  - With SKIP key " |◀◀ ", one can go back to service position "1".

ATTENTION:
When the radial arm is most outward with the disc on the turntable, the turntable (spindle motor) may turn reversely at high speed. In this case, with skip key bring the player in service position "1" or "3" from "2" immediately.

- Bring the player in service position "2".
  Press SKIP key " ▶▶| ".
- The display shows:
  - The MINUTES and SECONDS field: 00 3
  - The set is the same condition as in STOP.
  - With SKIP keys " |◀◀ " and " ▶▶| ", one can go to service positions "3" to "0" and vice versa.

Service position "E"

- Bring the player in service position "3".
- Without a disc on the turntable:
  - Press "PLAY" key, and the display shows the same as when the power is turned on normally.
  - Set a disc with "OPEN/CLOSE" key, and TOC data is displayed.
- With a disc on the turntable:
  - Press "PLAY" key, and TOC data is read and displayed.
- Press "PLAY" key again, and the mode is changed to PLAY.
- Functions: all keys have their original functions. (including remote controller)
- If an error is detected, the player will stop and give an error indication on the display. For a description of the error indication: See Error table.
- If the µP observes a system error, a system error indication will appear on the display: Er 01 through Er 12.
- With any key pressed, system error mode (including error message) will be cleared. (With "PLAY" key, the PLAY mode will be brought again.)
- If the µP observes an operation error, an operating error indication will be displayed for 1.5 seconds: Er 30 through Er 56.

The service programme can be abandoned again by turning the mains switch (POWER ON/OFF) off and on again (Hardware reset).

The error message number will be displayed only in service programme. (In normal mode, "ERROR" indication will just appear.)

SEARCH " ▶▶ " = Forward search key
SEARCH " ◀◀ " = Reverse search key
SKIP " ▶▶| " = TRACK NEXT key
SKIP " |◀◀ " = TRACK PREV key

ERROR TABLE

System errors

Indication	Cause	Check
Er 01	No RD	Si, So, RD, Photodiode signal processor
Er 02	No $\overline{TL}$ pulse at start-up	$\overline{TL}$, HF, Photodiode signal processor, CD disc present
Er 03	No lead-in track found	CD disc, radial arm position, REdig, Radial error processor
Er 04	Too many $\overline{TL}$ pulses in PLAY	CD disc, HFD
Er 05	$\overline{TL}$ pulse > 50 msec. in PLAY	CD disc, HF in, photodiodes
Er 06	No $\overline{TL}$ pulse within 0.5 sec. during track jumping	RE-lag circuit
Er 07	Subcoding error during PLAY	HF
Er 08	TOC error	CD disc, turntable motor control, radial arm position
Er 09	EEROM sel error	Replace EEROM
Er 10	Search error; selected point on disc cannot be reached	CD disc
Er 11	ROM error	Replace ROM
Er 12	RAM in µP MC68HC11 defective	Replace µP MC68HC11

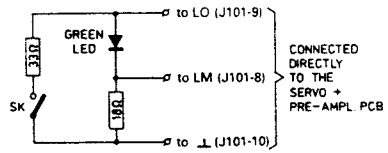
Operating errors

Er 30	" ▶▶| " key operated during the last track, with Repeat turned off.
Er 31	" |◀◀ " key operated during the first track, with Repeat turned off.
Er 32	Index selected before a track has been selected.
Er 34	The programme memory is full.
Er 35	The programme track is not present on this CD disc.
Er 36	Selected time in seconds greater than 59.
Er 38	Wrong time programmed.
Er 39	The selected track is not present on this CD disc.
Er 40	The selected track does not exist.
Er 41	FTS data storage error: memory full.
Er 42	FTS data storage error: no programme presented.
Er 43	FTS data storage error: no more disc number.
Er 44	FTS playback error: no FTS programme in the memory.
Er 45	FTS selection error: " ▶▶| " key actuated while FTS points towards end of the number of tracks.
Er 46	FTS selection error: " |◀◀ " key actuated while the FTS points to the beginning of the number of tracks.
Er 47	FTS selection error: " ▶▶| " or " |◀◀ " key actuated at the moment the µP is storing data.
Er 48	FTS selection error: " ◀◀ " key actuated while the CD disc has not yet been stored in the FTS memory; or TOC of the disc has not yet been read in.
Er 49	FTS selection error: " ▶▶ " key actuated.
Er 50	FTS clear error: "CANCEL" key actuated while data are being stored in the memory.
Er 51	"CANCEL" key actuated, but clear function has not been carried out.
Er 52	FTS data storage error: TOC of the CD disc, of which data should be saved, has not yet been read in.
Er 53	FTS playback error: Insufficient data of the TOC of the CD disc read in for processing in the FTS memory.
Er 54	"A – B" key actuated while the player was not in PLAY mode.
Er 55	"SEARCH" key actuated during Skip mode.
Er 56	End of the "FAST FORWARD or FAST REVERSE" search motion.

10 MEASUREMENTS AND ADJUSTMENT FOR CDM4 (SUB CHASSIS)

Check of the laser supply

The laser circuit generates a laser beam with LO signal at pin 17 of Q101, and the monitor diode makes LM signal. These circuits constitutes a feedback system and controls the laser output.
If, in that case, the laser (= complete CDM unit) is replaced, the new laser will also become defective.
However, it is impossible to check and repair a feedback system if a link is missing. For this reason the laser supply can be checked with the circuit below. The green LED replaces the laser, the voltage across the 18-Ohm resistor is fed back as monitor voltage, the 33-Ohm resistor and the switch serve to draw more current from the laser supply.



LED GREEN e.g. COY 94 IV 5322 130 32182

The above circuit is connected to connector J101 via an extension cable instead of flex print. The normal flex print is not suited for this purpose because of its high internal resistance.

Code no. extension cable 4622 322 40066

- The above flex print out of connector J101 on the servo + pre-amplifier PCB.
- Connect the circuit via the extension cable to connector J101.
- Select the play mode and SI/$\overline{RD}$ (pin 6 of Q101) will be "high".
- Measure the voltage LO (Laser Out) at test point 11.
  Note:
  SI/$\overline{RD}$ = 0, start initialization "high", is the play mode.
  At SI/$\overline{RD}$: "low", in the STANDBY state, LO = 0 V ± 0.2 V.

  SK open: 1.8 V < LO < 2.3 V
  170 mV < LM < 220 mV
  The green LED emits little light.
  SK closed: 1.8 V < LO < 2.3 V
  170 mV < LM < 220 mV
  The green LED emits little light.

- During the change-over from SK closed to SK open, the LED will emit more light for a short moment.
- The control sees to it that the same amount of current flows through the LED when SK is open and when SK is closed.

Repair procedure

Since laser, monitor diode and photodiodes are very sensitive to static charges, care should be taken that during measurements and adjustments the aids and yourself have a potential that is equal to that of the CD mechanism.

Laser adjustment for CDM4

- Measure the resistance of R108 + R134 with an ohmmeter and adjust potentiometer R134 so that R134 + R108 have a combined value of 1 kΩ.
- Check the monitor diode connections. Measure at test point 13 and ground (⊥).
- Put test disc **"5"** on the turn table.
- Switch on the set and select the PLAY mode or a similar service position.
- Take a DC voltmeter and measure across R116.
  The voltage across this resistor should **stay smaller than 1260 mV**.
- Check if HF is present. If not, stop the measurement immediately and analyze the fault.
- If HF is present, play track no. 1 of test disc "5" and adjust R134 (2.2 k) so that the sum of HF across R114 (test points 1 and 2) becomes 50 mV ± 2 mV with a DC voltmeter.
  Check, during the adjustment, that the voltage across R116 does not exceed 1260 mV.
- If the adjustment is not successful within the 1260 mV margin across R116, check the angle setting.

Adjustment of the focus off-set (FE-lag)

- **Coarse adjustment**

A - Place potentiometer R136 approximately in mid-position.
- Put test disc **"5"** on the turntable.
- Bring the player in service position **"2"**.
- The focussing motor can now start focussing. Check that the disc is moving.

B - Place with potentiometer R136 (Focus Offset) the focussing motor in optical horizontal position.
- Hereafter the fine adjustment of the focus offset has to be carried out.

- **Fine adjustment**

- Bring the player in service position **"2"**.
- Adjust potentiometer R106 (Focus Offset) for a voltage across R106 (test point 27) of 400 mV ± 40 mV.

Note:
Notice that CDM is in a horizontal position.

11 DETAILED MEASURING METHOD FOR THE SERVO + PRE-AMPLIFIER CIRCUIT

PHOTODIODE SIGNAL PROCESSOR IC (Q101)

- **Check the SI/$\overline{RD}$, LO, LM signals**

  SI/$\overline{RD}$ (pin 6; test point 24)
  LO (pin 17; test point 11)
  LM (pin 18; test point 13)

- With the SI/$\overline{RD}$ signal (= Start Initiation) the laser supply, among other things, is switched on.
  When the SI/$\overline{RD}$ signal is "high", the LO signal (= Laser Out) should be "high".
  Via the LM signal (= Laser Monitor) the power supply for the laser diode is controlled.

Position of Player	POWER ON	Service position "1"	PLAY
SI/RD signal	"low"	* "high"	"high"
LO signal	"low"	"high"	"high"

*) "low" pulse when focussing starts

- **Check the FE signal**

  FE (pin 15; test point 19)

- The FE signal (= Focus Error) is used to drive the focusing unit.
  When the SI/$\overline{RD}$ signal goes "low" pulse, the focal point will be searched for.
- When the player is brought into service position **"1"**, the objective will search for the focal point. At test point 19 the FE signal varies between +1.5 V and -1.5 V.
- When the player is brought into service position **"2"** (with disc on turntable), the FE signal ensures that the laser spot stays in focus. If an error signal is injected, the FE signal will correct.
- Inject successively a voltage of +5 V and -6 V (= +5B and -6B) via a 200 kΩ resistance to test point 25 and check the FE signal.

Signal injected : testpoint 25	+ 5V	− 6V
FE signal : test point 19	negative	positive

- **Check the FE lag**

  FE lag (pin 16; test point 22)

- **See adjustment of the focus off-set.**

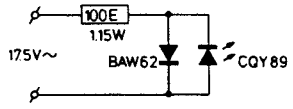
- **Check the D1 to D4 signals**

  D1 (pin 23; test point 6)
  D2 (pin 22; test point 4)
  D3 (pin 24; test point 7)
  D4 (pin 25; test point 8)

- The signals D1 to D4 are the error signals from the photodiode circuits.
- When in service position **"2"**, the focusing unit should keep in track.
  When the disc is moving, there should be a changing signal on test points 4, 6, 7 and 8.

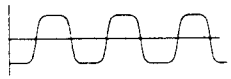
- **Check the photodiodes**

Connected the circuit below to an alternating voltage of 17.5 V.



100 Ω, 1.15W	- 4822 116 51098
BAW 62	- 4922 130 30613
CQY 89	- 4822 130 31332

Switch on the supply voltage (17.5 V) and bring the player in the stand-by mode or in service position **"0"**.
In this measurement, infrared diode CQY89 replaces the function of the laser diode.
When this diode is held above the objective unit, the infrared light falls on the 4 photodiodes.
When the 4 photodiodes are functioning, the following voltage form will be visible on test point 4, 6, 7 and 8 on the servo + pre-amplifier PCB.
(The amplitude depends on the distance between the IR diode and the objective).



Position of the oscilloscope: 100 ms/div.

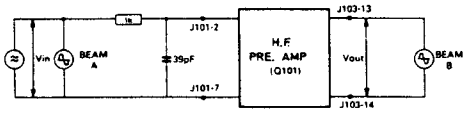
- **Check the HF-in signal**

  HF-in (pin 26; test point 3)

- The HF-in signal (= High Frequency in) is the information signal from the 4 photodiodes.

- **Check the HF amplifier in Q101**

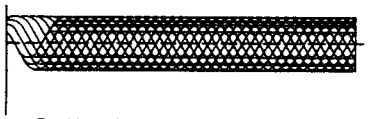
- Take the flexible PCB out of connector J101.
- Switch on the supply voltage.
- Inject a signal V-in of about 10 mVpp, 50 kHz, via the RC network, between connector pin J101-2 and connector pin J101-7 according to the diagram below.
- The output voltage (Vout) between connector pins J103-13 and J103-14 should be about 1 Vpp.



- **Check the HF-out signal**

  HF-out (pin 3; test point 21)

- The HF-out signal (= High-Frequency out) is the amplified information signal for the decoder circuit.
  During playback of test disc **"5"** (4822 397 30098), a so-called "eye pattern" should be present on test point 21 (see figure below).
- The HF signal should be present and stable in the PLAY mode and in service position **"E"** after the lead-in track has been read.
  In service position **"2"** and during the reading of the lead-in track, the HF signal is present, but is not stable.



Position of the oscilloscope: 0.5 µs/div.
Amplitude: about 1.5 Vpp

- **Check the DET, $\overline{TL}$ signals**

  DET (pin 4)
  $\overline{TL}$ (pin 11; test point 9)

- The DET signal (= Detector) gives information on the level of the HF signal to the high-frequency Level/ Drop-out detector of Q101.
- The $\overline{TL}$ signal (=Track Lost) will then go "low" in order to tell the servo µP that the tracking signals are unreliable.

Method:
(Can only be used in a playing set).

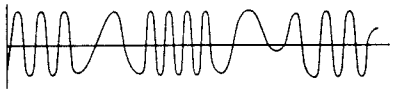
- Put test disc **"5A"** (4822 397 30098) on the turntable.
- When track number 10 or 15 is played, the drop-out pulses will be present on the DET signal (pin 4).
  (Position of oscilloscope: 2 ms/div.)

  When the disc is slowly braked by hand, $\overline{TL}$ pulse will be visible at test point 9. ("low" pulse or "low")

- **Check the RE1, RE2 signals**

  RE1 (pin 21; test point 14)
  RE2 (pin 20; test point 16)

- Signals RE1 and RE2 (= Radial Error) are the control signals for the arm during tracking.
- In service position **"2"**, the following signals should be visible at test point 14 and 16.



Position of the oscilloscope: 2 ms/div.
The frequency strongly depends on the eccentricity of the disc.

- **Check the $\overline{DODS}$/$\overline{CRI}$ signals**

  $\overline{DODS}$/$\overline{CRI}$ (pin 12; test point 18)

The $\overline{DODS}$ signal (=Drop Out Detector Suppression) avoids that Drop-Out signals influence the arm control during tracking jumping. ("low" in jumping)

Position of Player	Power ON	Service position "E"	Play	Search pause
$\overline{DODS}$/$\overline{CRI}$	"low"	"high"	"high"	"low" pulse

- **Check the SC (= Start Capacity) signal**

  SC (pin 5; test point 26)

Position of player	SC (pin 5)
POWER ON	4V
PLAY	+ 5V
Service position "1"	* 4V

*) Repeats for focusing.

- **Check the FE lag signal**

  FE lag (pin 16, test point 22)

- In service position **"2"**, **"E"** and in the PLAY mode, a voltage of about 400 mV (Focus Offset voltage) is present at this point.
  See adjustment of the focus off-set.

RADIAL ERROR PROCESSOR IC Q103

Check the signals coming from the servo µP and from photodiode signal processor Q101.

- **Check the RE-dig signal**

  RE-dig (RP) (pin 7; test point 31)

- With the RE dig signal (= Radial Error digital = Radial Polarity), the movement of the arm is controlled/corrected in case of track jumping and bumping against the player.
- In service position **"E"** or in the PLAY mode a square wave should be present at test point 31.
  Because of frequency variations this square wave is hard to trigger.
- In the positions " ⏮ " and " ⏭ " SKIP keys, the frequency of the square wave decreases.

- **Check the RE signal**

  RE (pin 15; test point 36)

- With the RE signal (= Radial Error) the light spot is kept on the track.
  When an error signal is injected, the RE signal will correct.
- Bring the player in service position **"E"**.
- Inject successively a voltage of +5 V and -6 V (= +5B and -6B), via a 120 kΩ resistance, to ICQ106 and check the RE signal.

Signal injected testpoint 38	+ 5V	– 6V
RE signal: test point 36	negative	positive

- **Check the RE-lag signal**

  RE lag (pin 18; test point 42)

Capacitor C121 in the RE-lag circuit has a memory function.
- It memorizes the degree of inclination of the disc.
- When a jump is made to a certain track on the disc, the memory should be cleared.
- This takes place by the decoder µP (QF02, B0 to B3) via ICQ103.
- During track jumping (SEARCH), slow pulses should be visible at test point 42 (position of the oscilloscope 0.1 ms/div.).

- **Check the RE1, RE2 signals**

  RE1 (pin 21; test point 14)
  RE2 (pin 20; test point 16)

- **See measuring method of RE1 and RE2.**

- **Check the B0 to B3 signals**

  B0 (pin 11; test point 37)
  B1 (pin 10; test point 38)
  B2 (pin 9; test point 41)
  B3 (pin 8; test point 39)

- With the B0 to B3 signals;
  the radial control is switched on and
  the level on the DAC output is controlled.
- Depending on the SEARCH directions " ◀◀ ", " ▶▶ " and total operation modes of 4, B0 to B3 signals become as shown below.

	STOP	PLAY	Service position "0", "1", "2" "◀◀" search	"▶▶" search
B0	"low"	"high"	"low"	"low"
B1	"high"	"high"	"high"	"high"
B2	"high"	"high"	"high"	"low"
B3	"high"	"low"	"high"	"high"

- **Check the VC signal**

  VC (connector point J102-1; test point 83)

- Place a disc on the turntable. The voltage at connector point J102-1 will be about Vc: -1.7 V < Vc < 0 V during playback.

12 DETAILED MEASURING METHOD FOR THE DECODER CIRCUIT

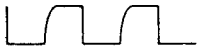
DECODER IC (Q501)

- **Check the MC signal**

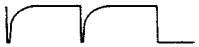
  MC (pin 24; test point 74)

The MC signal is used to control the speed of the turntable (spindle motor).

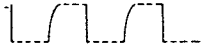
- In stand-by mode, the MC signal (Motor Control) corresponds to the figure below.
  Note:
  The repetition time of the MC signal is 11.3 µsec.
- Place a disc on the turntable.
- In position PLAY or service position "**E**", the MC signal corresponds to the figure below.
  Note:
  During start-up the duty cycle is 98 %, then the duty cycle of the signal becomes about 50 %.



Standby mode



At start



When reaching the normal speed

- **Check the HF signal**

  HF (eye pattern; test point 61)

- Place a disc on the turntable.
- When reading of the lead-in track is completed in the PLAY mode or in service position "**E**", normal HF signal becomes the eye pattern as shown below.
  Note:
  In service position "**2**" or during reading of the lead-in track the HF signal is not stable.

Amplitude ≈ 1.5 Vpp (eye pattern)

- **Check the Xin signal**

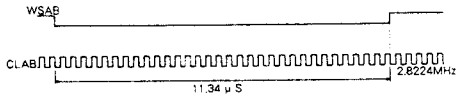
  Xin (pin 26; test point 77)

- The Xin frequency is 11.2896 MHz.
- If this frequency deviates, check XIN (pin 9) on ADOC IC (Q504). This frequency should also be 11.2896 MHz.

- **Check the timing signals meant for Filter IC (Q502)**

  WSAB(pin 4; test point 78)
  CLAB (pin 3; test point 79)
  DAAB (pin 2; test point 81)

- Place a disc on the turntable.
- Service position "**E**" or PLAY mode.
- Trigger the oscilloscope with the WSAB signal.
- Check the interrelation between the WSAB signal and the CLAB signal.
- The DAAB signal being sent to the Delay IC (Q565) can be observed by triggering the oscilloscope with the WSAB signal. (The data waveform is not stable.)



- **Check the EFAB signal**

  EFAB (pin 1; test point 66)

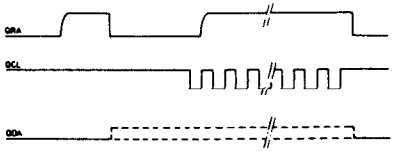
- Place test disc "**5A**" on the turntable.
- During playback, EFAB pulses should be present at test point 66 for soft braking of the disc and during fast search (F. Forward, F. Reverse).

- **Check the Q-channel signals**

  QRA (pin 38; test point 62)
  QCL (pin 40; test point 63)
  QDA (pin 37; test point 64)

- Place a disc on the turntable.
- Service position "**E**" or PLAY mode.
- Trigger the oscilloscope with the QRA signal (Q-channel Request Acknowledge).
- Check the interrelations of QRA and QCL (Q-channel-clock) signals between the master µP (QF01).
- If they are normal, check the QDA signal (Q-channel Data).

Note:
The QRA request is initiated by QF01 (QRA "high"). Then Decoder-A answers this request (QRA goes "low"). With the next leading clock pulse (QCL) the QRA signal is rendered "high" again by the QF01. As soon as the Decoder-A has taken in enough information via QDA, QRA will go "low" again. That is why the QRA times vary each time.



- **Check the SWAB/$\overline{\text{SSM}}$ signal**

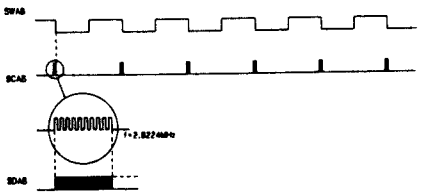
  SWAB/$\overline{\text{SSM}}$ (pin 42; test point 65)

- Motor start pulse when test point 65 is "high" for ≤ 0.2 sec.
- Motor stop pulse when test point 65 is "low" for ≤ 0.2 sec.
  Note:
  After the motor start pulse goes "high", SWAB information (Subcoding Word clock) will become visible at this point. The period time of that signal is 136 µsec (7.35 kHz).

- **Check the subcode clock signals**

  SWAB/$\overline{\text{SSM}}$ (pin 42, test point 65)
  SCAB (pin 44, test point 70)
  SDAB (pin 43, test point 68)

- Place a disc on the turntable.
- Service position "**E**" or PLAY mode.
- Trigger the oscilloscope with the SWAB signal at test point 65.
- Check the SCAB signal (Subcode Clock).
- Check the SDAB signal (Subcode Data).
- Check that the signals above are sent to ADOC (DIGITAL OUT) IC (Q504) without interruption. However, they go "low" at PAUSE/STOP mode.
  Note:
  While the burst of 10 clock pulses appear on SCAB, the Q-channel information is transferred on SDAB. Hereafter the P-bit indication follows.
  The P-bit is "high" between two bursts of 10 clock pulses in case of pause indication and "low" in case of music indication.



- **Check the $\overline{\text{DODS}}$/$\overline{\text{CRI}}$ signal**

  $\overline{\text{DODS}}$/$\overline{\text{CRI}}$ (pin 36; test point 18)

The $\overline{\text{CRI}}$ signal (Counter Reset) goes "low" in track jumping and the signal makes the internal counter to free-running status. (See PHOTODIODE SIGNAL PROCESSOR IC (Q101), Check the $\overline{\text{DODS}}$/$\overline{\text{CRI}}$ signal section.)

- **Check the $\overline{\text{DEEM}}$ signal**

  $\overline{\text{DEEM}}$ (pin 41; test point 69)

- Place test disc "**5**" on the turntable.
- During playback of track number 15, the $\overline{\text{DEEM}}$ signal should be "high". (DE-EMPHASIS ON)

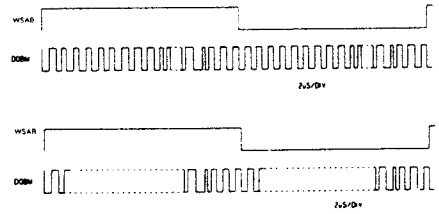
ADOC IC (Q504)

This IC (ADOC: Audio Digital Output Circuit) generates the DOBM signal out of the I²S data and subcode data.

- **Check the WSAB, DOBM signals**

  WSAB (pin 1; test point 78)
  DOBM (pin 13; test point 85)

- Place a disc on the turntable.
- STOP mode or PLAY mode.
- Trigger the oscilloscope with the WSAB signal.
- Check the DOBM signal.
  Note:
  As shown below, the DOBM signal makes a pattern when an audio signal enters, but the data section of the DOBM signal is not specified when the audio signal does not enter.



CHECK THE $\overline{\text{ATSB}}$, $\overline{\text{MUSB}}$ SIGNALS

$\overline{\text{ATSB}}$ (QF02, pin 20; test point 57)
$\overline{\text{MUSB}}$ (QF02, pin 21; test point 58)

- The $\overline{\text{ATSB}}$ signal goes "low" during searching with attenuation (–12 dB) in.
- The $\overline{\text{MUSB}}$ signal goes "low" during PAUSE, SKIP, and track jumping with mute in.

FILTER IC (Q563)

- **Check the signals between Decoder IC and Filter IC**

WSAB	**(W501-pin 2; test point 78)**
CLAB	**(W501-pin 3; test point 79)**
DAAB	**(W501-pin 1; test point 81)**
LRCI/WSAB	**(pin 28; test point 78)**
BCKI/CLAB	**(pin 2; test point 88)**
DIN	**(pin 1; test point 89)**

The DAAB, CLAB, WSAB signals are output from Decoder IC (Q501) in I²S format. A format conversion is required for inputting these data into the Filter IC (Q563). For this purpose, the DAAB signal is delayed by 16 bits with the CLAB clock in the Shift Register IC (Q565, Q566). As a result, the delayed DAAB signal from pin 13 of IC566 is input to Filter IC (Q563). (See the timing chart.)

- **Check the Filter IC signals**

  WCKO/WSI (pin 25; test point 95)
  BCKO/SCKI (pin 26; test point 92)
  DOL/SDI1 (pin 24; test point 93)
  DOR/SDI2 (pin 23; test point 94)

This IC converts 16-bit data to 8 times oversampling 20-bit data and outputs Lch and Rch data simultaneously. (See the timing chart.)

- Put a disc on the turntable.
- Service position "E" or PLAY mode.
- Trigger the oscilloscope with the WCKO/WSI signal.
- Check the signals above.

- **Check the other signals**

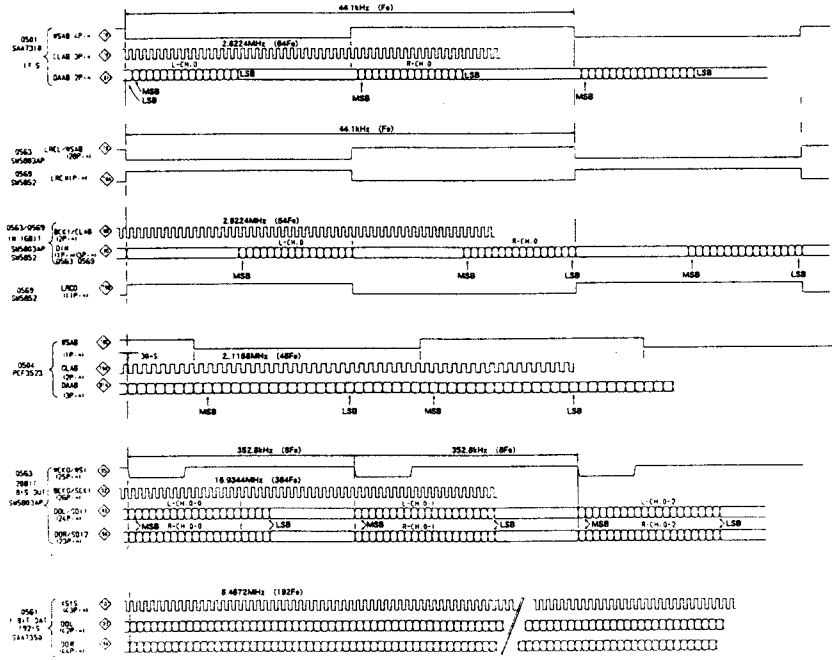
  MUT (pin 15; test point 15)
  DEEM/DIEM (pin 16, test point 69)

- The MUT signal is the inverted signal of the $\overline{\text{MUSB}}$. (Q567-5/6)
  When the MUT signal goes "high", mute is in.
- When the DEEM/DIEM signal goes "high", digital de-emphasis is in.

CONTROL IC (Q562)

This IC is the μP used for controlling the Filter IC (Q563). When the supply voltage is applied, MS1, MS2, MS3, MDT and $\overline{\text{MEN}}$ of 5-bit signal complete the initial setting (16-bit input, 20-bit output, noise shaper ON) etc. of Filter IC (Q563).
After the initial setting is completed and when the $\overline{\text{ATSB}}$ signal goes "low", above control bits (MS1 to MS3, MDT and $\overline{\text{MEN}}$) command the Filter IC (Q563) to develop attenuation (−12 dB).

Timing chart



BITSTREAM CONVERSION SYSTEM

- **Check the BS DAC SAA7350 (Q561)**

  XSYS2 (pin 43; test point 101)
  DOL (pin 42; test point 102)
  DOR (pin 44; test point 103)

Though this IC is a bit stream type conversion DAC, the D/A conversion is not made here.
In this IC, 8 times oversampling 20-bit data becomes a noise shaped 1-bit (PDM) 128fs (8fs x 16) data, and sent simultaneously to Lch and Rch. (See the timing chart.)
With these XSYS2, DOL and DOR signals, non-inversion and inversion processes are carried out in D-F. F. IC (Q564) and each of them is sent to respective DAC.

- **1 BIT DAC: DAC7 (QD01, QD02)**

The 1bit (PDM) non-inverted or inverted data makes D/A conversion with switched capacitors and op-amps inside the IC.
As a result, Lch (QD01) and Rch (QD02) become double differential type outputs.
(This cancels in-phase noises, decrease THD and improves separation and distortion factors in low frequency range.)

- **After DAC**

The audio signals are output through the double differential stages (Q601 to Q604), LPFs (Q605, Q606) and the unbalance circuits.

13 ELECTRICAL PARTS LIST

ASSIGNMENT OF COMMON PARTS CODES.

RESISTOR

R***: (1) GD05---140, Carbon film fixed resistor, ±5%, 1/4W
R***: (2) GD05---160, Carbon film fixed resistor, ±5%, 1/6W
① — Resistance value

Examples
① Resistance value

0.1Ω ... 001	10Ω ... 100	1kΩ ... 102	100kΩ ... 104
0.5Ω ... 005	18Ω ... 180	2.7kΩ ... 272	680kΩ ... 684
1Ω ... 010	100Ω ... 101	10kΩ ... 103	1MΩ ... 105
6.8Ω ... 068	390Ω ... 391	22kΩ ... 223	4.7MΩ ... 475

(Note) Please distinguish 1/4W from 1/6W by the shape of parts used actually.

C***: CERAMIC CAP.
(1) DD1---370, Ceramic condenser, Disc type, Temp. coeff. P350 – N1000, 50V
①② — ① Capacity value, ② Tolerance

Examples
① Tolerance (Capacity deviation)
±0.25pF ... 0
±0.5pF ... 1
±5% ... 5
* Tolerance of COMMON PARTS handled here are as follows.
0.5pF ~ 5pF ... ±0.25pF
6pF ~ 10pF ... ±0.5pF
12pF ~ 560pF ... ±5pF
② Capacity value

0.5pF ... 005	3pF ... 030	100pF ... 101
1pF ... 010	10pF ... 100	220pF ... 221
1.5pF ... 015	47pF ... 470	560pF ... 561

C***: CERAMIC CAP.
(1) DK16---300, High dielectric constant ceramic condenser, Disc type, Temp. chara. 2B4, 50V
① — Capacity value

Examples
② Capacity value

100pF ... 101	1000pF ... 102	10000pF ... 103
470pF ... 471	2200pF ... 222	

C***: ELECTROLY CAP. (⏚), FILM CAP. (⫫)
(1) EA---10, Electrolytic condenser, One-way lead type, Tolerance ±20%
①② — ① Dielectric strength, ② Capacity value

Examples
① Capacity value

0.1μF ... 104	4.7μF ... 475	100μF ... 107
0.33μF ... 334	10μF ... 106	330μF ... 337
1μF ... 105	22μF ... 226	1100μF ... 108
		2200μF ... 228

② Working voltage

6.3V ... 006	25V ... 025
10V ... 010	35V ... 035
16V ... 016	50V ... 050

(2) DF15--- 350, Plastic film condenser, One-way type, Mylar ±5% 50V
① — Capacity value

Examples
① Capacity value

0.001μF (1000pF) .. 102	0.1μF ... 104
0.0018μF 182	0.56μF ... 564
0.01μF 103	1μF ... 105
0.015μF 153	

REF. DESIG.	PART NO.	DESCRIPTION
		PD16-DAC CURCUIT BOARD
		PD16-CAPACITORS
CD01 ~ CD08	4822 126 12061	CERAMIC 0.1μF ±10% 25V CHIP
CD09	4822 123 30363	MICA 820PF ±5% CHIP
CD10	4822 123 30363	MICA 820PF ±5% CHIP
CD11 ~ CD14	4822 123 30359	MICA 220PF ±5% 100WV CHIP
CD19 ~ CD22	4822 123 30359	MICA 220PF ±5% 100WV CHIP
CD23	4822 123 30363	MICA 820PF ±5% CHIP
CD24	4822 123 30363	MICA 820PF ±5% CHIP
CD25 ~ CD34	4822 126 12061	CERAMIC 0.1μF ±10% 25V CHIP
CD51 ~ CD54	4822 126 12061	CERAMIC 0.1μF ±10% 25V CHIP
CD61 ~ CD64	4822 124 90353	ELECT 100μF 10V
CD65 ~ CD68	4822 124 90363	ELECT 220μF 10V
C561	4822 122 32669	CERAMIC 47000μF +80%-20% CHIP
C562	4822 124 41539	ELECT 47μF 16V
C563	5322 122 31946	CERAMIC 27PF ±5% CHIP
C564	5322 122 31946	CERAMIC 27PF ±5% CHIP
C565	4822 124 41539	ELECT 47μF 16V
C566	4822 122 32669	CERAMIC 47000μF +80%-20% CHIP
C567	4822 126 12061	CERAMIC 0.1μF ±10% 25V CHIP
C568	4822 122 32669	CERAMIC 47000μF +80%-20% CHIP
C569	4822 122 32669	CERAMIC 47000μF +80%-20% CHIP
C570	5322 122 32531	CERAMIC 100PF ±5% CHIP
C571	5322 122 32531	CERAMIC 100PF ±5% CHIP
C572	4822 122 32669	CERAMIC 47000μF +80%-20% CHIP
C578	4822 122 32669	CERAMIC 47000μF +80%-20% CHIP
C601 ~ C604	4822 123 30361	MICA 56PF ±5% 500WV CHIP
C605	4822 121 51126	FILM 2200PF ±2%125V CHIP
C606	4822 121 51126	FILM 2200PF ±2%125V CHIP
C607	4822 123 30362	MICA 56PF ±5% CHIP
C608	4822 123 30362	MICA 56PF ±5% CHIP
C611 ~ C618	4822 124 22238	ELECT 100μF 25V
C621 ~ C628	5322 122 32654	CERAMIC 22000PF ±10% CHIP
		PD16-RESISTORS
RD01 ~ RD04	4822 111 90967	4.7Ω ±5% 1/4W FUSE
RD05	4822 111 91369	1.5KΩ ±5% 1/10W CHIP
RD06	4822 111 91369	1.5KΩ ±5% 1/10W CHIP
RD07	4822 116 83255	3.3KΩ ±1% 1/10W CHIP
RD08	4822 116 83255	3.3KΩ ±1% 1/10W CHIP
RD09	4822 116 83352	560Ω ±5% 1/10W CHIP
RD10	4822 116 83352	560Ω ±5% 1/10W CHIP
RD11	4822 116 83255	3.3KΩ ±1% 1/10W CHIP
RD12	4822 116 83255	3.3KΩ ±1% 1/10W CHIP

REF. DESIG.	PART NO.	DESCRIPTION
RD13 ~ RD16 RD17 ~ RD20 RD21 ~ RD24	4822 111 91355	13KΩ ±1% 1/10W CHIP
	4822 111 90967	4.7Ω ±5% 1/4W FUSE
	4822 111 91355	13KΩ ±1% 1/10W CHIP
RD25	4822 116 83255	3.3KΩ ±1% 1/10W CHIP
RD26	4822 116 83255	3.3KΩ ±1% 1/10W CHIP
RD27	4822 116 83352	560Ω ±5% 1/10W CHIP
RD28	4822 116 83352	560Ω ±5% 1/10W CHIP
RD29	4822 111 91369	1.5KΩ ±5% 1/10W CHIP
RD30	4822 111 91369	1.5KΩ ±5% 1/10W CHIP
RD31	4822 116 83255	3.3KΩ ±5% 1/10W CHIP
RD32	4822 116 83255	3.3KΩ ±5% 1/10W CHIP
RD33 ~ RD38	4822 111 90967	4.7Ω ±5% 1/4W FUSE
R561	4822 111 90967	4.7Ω ±5% 1/4W FUSE
R562	4822 111 90897	1MΩ ±5% 1/10W CHIP
R563	4822 111 90894	1KΩ ±5% 1/10W CHIP
R564	4822 111 90897	1MΩ ±5% 1/10W CHIP
R565	4822 111 90967	4.7Ω ±5% 1/4W FUSE
R566	4822 111 90893	100Ω ±5% 1/10W CHIP
R569	4822 111 90897	1MΩ ±5% 1/10W CHIP
R572	4822 111 90893	100Ω ±5% 1/10W CHIP
R573	4822 111 90893	100Ω ±5% 1/10W CHIP
R575	4822 111 90892	0Ω ±5% 1/10W CHIP
R590	4822 111 90967	4.7Ω ±5% 1/4W FUSE
R601	4822 111 90883	10KΩ ±1% 1/10W CHIP
R602	4822 111 90883	10KΩ ±1% 1/10W CHIP
R603 ~ R606	4822 116 83255	3.3KΩ ±1% 1/10W CHIP
R607	4822 111 90883	10KΩ ±1% 1/10W CHIP
R608	4822 111 90883	10KΩ ±1% 1/10W CHIP
R609 ~ R612	4822 116 83255	3.3KΩ ±1% 1/10W CHIP
R613 ~ R620	4822 111 90883	10KΩ ±1% 1/10W CHIP
R621 ~ R624	4822 116 83232	8.2KΩ ±1% 1/10W CHIP
R625 ~ R628	4822 117 10183	2.61KΩ ±1% 1/10W CHIP
R629 ~ R636	4822 111 90731	47Ω ±2% 1/4W FUSE
R639	4822 111 90892	0Ω ±5% 1/10W CHIP
R640	4822 111 90892	0Ω ±5% 1/10W CHIP
		PD16-SEMICONDUCTORS
QD01	4822 209 31013	IC DAC7 TDA1547 1BIT DAC
QD02	4822 209 31013	IC DAC7 TDA1547 1BIT DAC
Q561	4822 209 30436	IC BS DAC SAA7350
Q563	4822 209 31011	IC DIGITAL FIL SM5803APT
Q564	4822 209 61494	IC 74HC74F
Q565	4822 209 62764	IC 74HC164F
~~Q566~~	~~4822 209 62764~~	~~IC 74HC164F~~
Q567	5322 209 73187	IC 74HC04F
Q601	4822 209 83359	IC NJM5532M
Q602	4822 209 83359	IC NJM5532M

REF. DESIG.	PART NO.	DESCRIPTION
Q603 ~ Q606	4822 209 30062	IC NJM5534M FLAT
		PD16-MISCELLANEOUS
L601	4822 157 53873	CHOKE COIL 100µH
L602	4822 157 53873	CHOKE COIL 100µH
X561	4822 242 72395	CRYSTAL, 11.2896MHZ
X562	4822 242 72223	CERAMIC VIBRATOR, CST4.00MGW CERALOCK
		PD26-DIGITAL OUT CURCUIT BOARD
		PD26-CAPACITORS
CT01	4822 124 41539	ELECT 47µF 16V
CT02	4822 122 30103	CERAMIC 0.022µF +80% -20% 50V
CT04	4822 122 40617	CERAMIC 0.1µF +80% -20%
CT06	4822 122 30103	CERAMIC 0.022µF +80% -20% 50V
CT07	4822 122 40617	CERAMIC 0.1µF +80% -20%
		PD26-SEMICONDUCTORS
QT01	4822 209 72503	IC HI SPEED 74HC04
QT02	4822 209 73951	IC RESET PST523D (4.2V LOW)
		PD26-MISCELLANEOUS
JT02	4822 265 20354	TERMINAL 1P RCA GOLD
JT03	4822 265 20629	TERMINAL 1P RCA ORANGE
JT04	4822 267 31219	JACK OPTICAL TOTX174
LT01	4822 158 60605	FERRITE CORE, BEADS
LT02	4822 142 60388	PULSE TRANSFORMER
		PP16-POWER / AUDIO CURCUIT BOARD
		PP16-CAPACITORS
CN01	4822 124 90357	ELECT 2.2µF 50V
C651	4822 123 30093	MICA 5PF ±0.5PF 500V
C652	4822 123 30093	MICA 5PF ±0.5PF 500V
C653 ~ C656	4822 124 23398	ELECT 220µF 10V
C657 ~ C660	4822 124 22572	ELECT 100µF 63V
C661	4822 122 40617	CERAMIC 0.1µF +80% -20%
C663	4822 124 90058	ELECT 47µF 25V
C664	4822 124 90058	ELECT 47µF 25V
C665	4822 122 40617	CERAMIC 0.1µF +80% -20%
C834	4822 124 22239	ELECT 3300µF 25V
C835	4822 124 22239	ELECT 3300µF 25V
C836	4822 124 90364	ELECT 220µF 16V
C837	4822 124 90364	ELECT 220µF 16V
C838	4822 124 23649	ELECT 470µF 25V
C842	4822 124 90388	ELECT 3300µF 16V
C845	4822 124 90364	ELECT 220µF 16V
C853	4822 124 42037	ELECT 6800µF 35V
C854	4822 124 42037	ELECT 6800µF 35V
C855	4822 124 23364	ELECT 47µF 50V
~~C856~~	~~4822 124 23364~~	ELECT 47µF 50V
C857	4822 124 22734	ELECT 470µF 25V
C858	4822 124 22734	ELECT 470µF 25V
C863	4822 124 23363	ELECT 220µF 6.3V
C864	4822 124 90364	ELECT 220µF 16V
C872	4822 124 90364	ELECT 220µF 16V
C873	4822 124 23363	ELECT 220µF 6.3V

REF. DESIG.	PART NO.	DESCRIPTION
		PP16-RESISTORS
R653	4822 050 24642	4.64KΩ ±2% 1/4W
R654	4822 050 24642	4.64KΩ ±2% 1/4W
R655	4822 050 24643	46.4KΩ ±2% 1/4W
R656	4822 050 24643	46.4KΩ ±2% 1/4W
R657	4822 050 21542	1.54KΩ ±2% 1/4W
R658	4822 050 21542	1.54KΩ ±2% 1/4W
R659	4822 050 21001	100Ω ±2% 1/4W
R660	4822 050 21001	100Ω ±2% 1/4W
R661	4822 050 21003	10KΩ ±2% 1/4W
R662	4822 050 21003	10KΩ ±2% 1/4W
R663	4822 050 22153	21.5KΩ ±2% 1/4W
R664	4822 050 22153	21.5KΩ ±2% 1/4W
R691 ~ R694	4822 111 90731	47Ω ±2% 1/4W FUSE
R801	4822 117 10229	6.81KΩ ±2% 1/4W
R802	4822 117 10229	6.81KΩ ±2% 1/4W
R803 ~ R806	4822 050 21782	1.78KΩ ±2% 1/4W
R807	4822 050 21212	1.21KΩ ±2% 1/4W
R808	4822 050 21212	1.21KΩ ±2% 1/4W
R809	4822 050 21782	1.78KΩ ±2% 1/4W
R810	4822 050 21782	1.78KΩ ±2% 1/4W
R811	4822 050 21212	1.21KΩ ±2% 1/4W
R812	4822 050 21212	1.21KΩ ±2% 1/4W
▲ R813	4822 111 90967	4.7Ω ±5% 1/4W FUSE [/00B]
▲ R814	4822 111 90967	4.7Ω ±5% 1/4W FUSE [/00B]
R862	4822 050 21002	1KΩ ±2% 1/4W
R863	4822 050 21002	1KΩ ±2% 1/4W
R864	4822 050 21782	1.78KΩ ±2% 1/4W
R866	4822 050 21212	1.21KΩ ±2% 1/4W
R867	4822 050 25621	562Ω ±2% 1/4W
R872	4822 050 25621	562Ω ±2% 1/4W
R873	4822 050 21002	1KΩ ±2% 1/4W
R874	4822 050 21212	1.21KΩ ±2% 1/4W
R875	4822 050 21002	1KΩ ±2% 1/4W
R876	4822 050 21782	1.78KΩ ±2% 1/4W
		PP16-SEMICONDUCTORS
D651	4822 130 33305	DIODE 1SS176, MA165, 1SS245 30V 0.1A
▲ D831	4822 130 80907	DIODE S2VB20
▲ D841 ~ ▲ D844	4822 130 32508	DIODE RL103E , DSF10C
▲ D851 ~ ▲ D854	4822 130 33074	DIODE 30DF-2 200V 3A
D855	4822 130 33664	ZENER DIODE HZ6L (3) 6.2V
D856	4822 130 33664	ZENER DIODE HZ6L (3) 6.2V
D861	4822 130 82956	ZENER DIODE HZ2CLL 2.4V (±0.2V)
D871	4822 130 82956	ZENER DIODE HZ2CLL 2.4V (±0.2V)
D872	4822 130 33759	ZENER DIODE 04AZ4.7, RD4.7ES, MTZJ4.7B
QN01	4822 209 83312	IC RELAY DRIVE TA7317P
Q651	4822 209 70226	IC NJM5534D
Q652	4822 209 70226	IC NJM5534D
▲ Q651	4822 130 43023	TRANSISTOR 2SA1306 (O, Y)
▲ Q852	4822 130 43311	TRANSISTOR 2SC3298 (O, Y)
▲ Q853	4822 130 60107	TRANSISTOR 2SA1048 (Y, GR)
▲ Q854	4822 130 60839	TRANSISTOR 2SC2458 (Y, GR)
Q855	4822 130 60107	TRANSISTOR 2SC1048 (Y, GR)
Q856	4822 130 60839	TRANSISTOR 2SC2458 (Y, GR)
▲ Q861	4822 130 43311	TRANSISTOR 2SC3298 (O, Y)
Q862	4822 130 60839	TRANSISTOR 2SC2458 (Y, GR)
Q863	4822 130 60839	TRANSISTOR 2SC2458 (Y, GR)
Q864	4822 130 60839	TRANSISTOR 2SC2458 (Y, GR)

REF. DESIG.	PART NO.	DESCRIPTION
▲ Q871	4822 130 43023	TRANSISTOR 2SA1306 (O, Y)
Q872	4822 130 60107	TRANSISTOR 2SA1048 (Y, GR)
Q873	4822 130 60107	TRANSISTOR 2SA1048 (Y, GR)
		PP16-MISCELLANEOUS
▲ F831	4822 253 30402	FUSE T 800MA.BS. [/00B]
▲ F832	4822 253 30402	FUSE T 800MA.BS. [/00B]
▲ F841	4822 253 30402	FUSE T 800MA.BS. [/00B]
▲ F851	4822 253 30402	FUSE T 800MA.BS. [/00B]
▲ F852	4822 253 30402	FUSE T 800MA.BS. [/00B]
J602	4822 267 30955	JACK 2P RCA
L651	4822 280 20448	RELAY DC9V RA-9W-K
L653	4822 158 60605	FERRIT CORE, BEADS
L654	4822 158 60605	FERRIT CORE, BEADS
ST01	4822 277 21559	SLIDE SWITCH, REMOTE INT/ EXT
		PP26- REGULATOR CIRCUIT BOARD
		PP26-SEMICONDUCTORS
▲ Q831	4822 209 62762	IC REG NJN7909FA -9V 1A
▲ Q832	4822 209 62761	IC REG NJM7809FA +9V 1A
▲ Q841	4822 209 31631	IC REG NJM7805FA +5V 1A
		PS26-POWER SWITCH CIRCUIT BOARD
		PS26-CAPACITORS
GH02	4822 121 43732	FILM 0.01µF ±20% 250V
		PS26-MISCELLANEOUS
LH01	4822 157 70419	NOISE FILTER, CHOKE
SH02	4822 276 11141	PUSH SWITCH, POWER
		PU16-CONTROL / DECODER CIRCUIT BOARD
		PU16-CAPACITORS
CF03	4822 124 22274	ELECT 4.7µF 50V
CF04	4822 124 41539	ELECT 47µF 16V
CF05	5322 122 32654	CERAMIC 0.022µF ±10% CHIP
CF06	5322 122 32654	CERAMIC 0.022µF ±10% CHIP
CF07	4822 124 41539	ELECT 47µF 16V
CF08	5322 122 32654	CERAMIC 0.022µF ±10% CHIP
CF09	4822 124 41539	ELECT 47µF 16V
CF10	5322 122 32654	CERAMIC 0.022µF ±10% CHIP
CF13	4822 124 41539	ELECT 47µF 16V
CF14	5322 122 32654	CERAMIC 0.022µF ±10% CHIP
CF17 ~ CF19	4822 122 32669	CERAMIC 0.047µF +80%-20% CHIP
CF20	5322 122 32654	CERAMIC 0.022µF ±10% CHIP
CF50	4822 122 32669	CERAMIC 0.047µF +80%-20% CHIP
CM01	4822 124 22274	ELECT 4.7µF 50V
CM04	5322 122 34098	CERAMIC 0.01µF ±10% CHIP
CM05	5322 122 34098	CERAMIC 0.01µF ±10% CHIP
CM07	4822 122 33714	CERAMIC 0.1µF +80%-20% CHIP
CM08	4822 122 33714	CERAMIC 0.1µF +80%-20% CHIP
CM09	5322 122 32654	CERAMIC 0.022µF ±10% CHIP
C154	4822 122 32669	CERAMIC 0.047µF +80%-20% CHIP
C155	4822 122 32669	CERAMIC 0.047µF +80%-20% CHIP
C156	4822 124 41539	ELECT 47µF 16V
C157	4822 124 41539	ELECT 47µF 16V
C501	4822 122 32694	CERAMIC 47PF ±5% CHIP
C504	4822 124 90357	ELECT 2.2µF ±5% 50V

REF. DESIG.	PART NO.	DESCRIPTION
C506	5322 122 32654	CERAMIC 0.022µF ±10% CHIP
C514	4822 122 32669	CERAMIC 0.047µF +80%-20% CHIP
C515	4822 124 22274	ELECT 4.7µF 16V
C521	4822 124 41539	ELECT 47µF 16V
C522	4822 122 32669	CERAMIC 0.047µF +80%-20% CHIP
C523	4822 124 41539	ELECT 47µF 16V
C524	4822 122 32669	CERAMIC 0.047µF +80%-20% CHIP
C525	4822 122 32669	CERAMIC 0.047µF +80%-20% CHIP
		PU16-RESISTOR
RF03	4822 111 90895	10KΩ ±5% 1/10W CHIP
RF04	4822 111 90907	22KΩ ±5% 1/10W CHIP
RF05 ~ RF07	4822 111 90895	10KΩ ±5% 1/10W CHIP
RF09 ~ RF12	4822 111 90895	10KΩ ±5% 1/10W CHIP
RF13	4822 111 90918	4.7KΩ ±5% 1/10W CHIP
RF15	4822 111 90897	1MΩ ±5% 1/10W CHIP
RF22	4822 111 90967	4.7Ω ±5% 1/4W FUSE
RF23 ~ RF25	4822 111 90895	10KΩ ±5% 1/10W CHIP
RF26	4822 111 90896	100KΩ ±5% 1/10W CHIP
RF29	4822 111 90895	10KΩ ±5% 1/10W CHIP
RF30	4822 111 90895	10KΩ ±5% 1/10W CHIP
RF41 ~ RF48	4822 111 90895	10KΩ ±5% 1/10W CHIP
RF49	4822 111 90919	47KΩ ±5% 1/10W CHIP
RF50	4822 111 90906	2.2KΩ ±5% 1/10W CHIP
RF51	4822 111 90896	100KΩ ±5% 1/10W CHIP
RF52	4822 111 90896	100KΩ ±5% 1/10W CHIP
RF53	4822 111 90895	10KΩ ±5% 1/10W CHIP
RF99	4822 111 90895	10KΩ ±5% 1/10W CHIP
RM01	4822 111 90919	47KΩ ±5% 1/10W CHIP
RM02	4822 111 90918	4.7KΩ ±5% 1/10W CHIP
RM03	4822 111 90918	4.7KΩ ±5% 1/10W CHIP
RM06 ~ RM08	4822 111 90918	4.7KΩ ±5% 1/10W CHIP
RM11	4822 111 90918	4.7KΩ ±5% 1/10W CHIP
R151	4822 111 90918	4.7KΩ ±5% 1/10W CHIP
R152	4822 111 90919	47KΩ ±5% 1/10W CHIP
R153	4822 111 90896	100KΩ ±5% 1/10W CHIP
R154	4822 111 90897	1MΩ ±5% 1/10W CHIP
R155	4822 111 90896	100KΩ ±5% 1/10W CHIP
R156	4822 116 83255	3.3KΩ ±5% 1/10W CHIP
R157	4822 111 90922	5.6KΩ ±5% 1/10W CHIP
R158	4822 111 91368	120KΩ ±5% 1/10W CHIP
R159	4822 116 83609	390KΩ ±5% 1/10W CHIP
R160	4822 111 90899	15KΩ ±5% 1/10W CHIP
R161	4822 111 90918	4.7KΩ ±5% 1/10W CHIP
R162	4822 111 90896	100KΩ ±5% 1/10W CHIP
R163	4822 111 90919	47KΩ ±5% 1/10W CHIP
R164	4822 111 91075	1.2KΩ ±5% 1/10W CHIP
R165	4822 111 91368	120KΩ ±5% 1/10W CHIP
R501	4822 111 90906	2.2KΩ ±5% 1/10W CHIP
R502	4822 111 90907	22KΩ ±5% 1/10W CHIP
R503	4822 111 90897	1MΩ ±5% 1/10W CHIP
R504	4822 116 81011	75Ω ±5% 1/10W CHIP
R505	4822 111 90916	3.9KΩ ±5% 1/10W CHIP
R506	4822 111 90895	10KΩ ±5% 1/10W CHIP
R507	4822 111 90908	220KΩ ±5% 1/10W CHIP
R508	4822 111 91369	1.5KΩ ±5% 1/10W CHIP
R509	4822 111 90894	1KΩ ±5% 1/10W CHIP
R511	4822 111 90892	0Ω ±5% 1/10W CHIP
R520	4822 111 90967	4.7Ω ±5% 1/4W FUSE
R523	4822 111 90892	0Ω ±5% 1/10W CHIP

REF. DESIG.	PART NO.	DESCRIPTION
R525	4822 111 90894	1KΩ ±5% 1/10W CHIP
R574	4822 111 90892	0Ω ±5% 1/10W CHIP
		PU16-SEMICONDUCTORS
DM02	4822 130 32635	DIODE MA-151K CHIP
DM03	4822 130 32866	DIODE MA-151WA CHIP
DM05	4822 130 32635	DIODE MA-151K CHIP
DM06 ~ DM08	4822 130 32866	DIODE MA151WA CHIP
D151	4822 130 32868	DIODE MA153 CHIP
QF01	4822 209 62768	MICROPROCESSOR MAIN µ-COM MC68HC11A0P
QF02	4822 209 62756	IC MC68HC24
QF04	4822 130 50487	IC RECTIFIER OTP (FOR CD-10)
QF05	5322 209 71555	IC MB74HC373
QF06	4822 209 51273	IC MSM2816A EE- PROM
QF08	4822 209 31928	IC CMOS 74HC00
QF09	4822 209 31928	IC CMOS 74HC00
QF11	4822 209 73951	IC RESET PST523D (4.2V LOW)
QF13	4822 130 60941	DIGITAL TRANSISTOR DTA114EK
QF14	4822 130 90451	DIGITAL TRANSISTOR DTC114EK
QF15	4822 130 61437	DIGITAL TRANSISTOR DTC114YK
QF16	4822 130 61436	DIGITAL TRANSISTOR DTA114YK
QM01	4822 209 83803	IC LB1645N
QM02	4822 209 83803	IC LB1645N
QM03	4822 209 31928	IC CMOS 74HC00 FLAT
QM04	4822 130 90449	DIGITAL TRANSISTOR DTC144
QM05 ~ QM07	4822 130 60941	DIGITAL TRANSISTOR DTA114EK
QM08	4822 130 90449	DIGITAL TRANSISTOR DTC144
Q151	4822 209 83357	IC QFP NJM4560M
Q152	4822 130 42733	TRANSISTOR 2SA1162(G) CHIP
Q153	4822 130 61799	DIGITAL TRANSISTOR DTA144TK
Q501	4822 209 63453	IC DEM/ERCO SAA7310 QFP
Q502	4822 209 73952	IC D-RAM MB81416C-15, MN4264P-15
Q503	4822 130 61438	TRANSISTOR 2SA1005 (L,R)
Q504	4822 209 30439	IC ADOC PCF3523P
Q505	4822 209 63379	IC 74HC08 FLAT
Q568	4822 209 31012	IC RESET PST529C (4.5V LOW)
		PU16-MISCELLANEOUS
L501	4822 152 20647	CHOKE COIL 2.2µH
XF01	4822 242 72066	CERAMC VIBRATOR 8MHZ CST8.00MHZ(MT)
		PV16-SERVO CURCUIT BOARD
		PV16-CAPACITORS
C101	4822 121 42327	FILM 470PF ±5% 50V
C103	4822 122 40306	CERAMIC 0.047µF +80%-20% 50V
C110	4822 124 41539	ELECT 47µF 16V
C113	4822 122 40306	CERAMIC 0.047µF +80%-20% 50V
C114	4822 122 40306	CERAMIC 0.047µF +80%-20% 50V
C126	4822 124 41539	ELECT 47µF 16V
C128	4822 122 40306	CERAMIC 0.047µF +80%-20% 50V
C132	4822 122 40306	CERAMIC 0.047µF +80%-20% 50V
C133	4822 124 41539	ELECT 47µF 16V
C134	4822 124 41539	ELECT 47µF 16V
C135	4822 122 40306	CERAMIC 0.047µF +80%-20% 50V
C136	4822 124 41539	ELECT 47µF 16V
C137	4822 122 40306	CERAMIC 0.047µF +80%-20% 50V
C140	4822 124 41539	ELECT 47µF 16V

REF. DESIG.	PART NO.	DESCRIPTION
		PV16-RESISTORS
R116	4822 115 90194	15Ω ±2%1/4W FUSE
R134	4822 100 20681	2.2KΩ TRIMMING LASER ADJ
R136	4822 100 11352	22KΩ TRIMMING FOCUS OFFSET ADJ
R141	4822 111 90967	4.7Ω ±5% 1/4W FUSE
R146	4822 111 90967	4.7Ω ±5% 1/4W FUSE
		PV16-SEMICONDUCTORS
D132	4822 130 80272	ZENER DIODE 04AZ7.5, RD7.5ES, MTZJ7.5C
D133	4822 130 80272	ZENER DIODE 04AZ7.5, RD7.5ES, MTZJ7.5C
D134	4822 130 32508	DIODE RL103E, DSF10C
Q101	4822 209 30436	IC HF & FOC TDA8808 QFP
Q102	4822 130 61441	TRANSISTOR 2SD1862 (Q, R)
Q103	4822 209 30437	IC RADIAL TDA8809 QFP
Q106	4822 209 62755	IC POWER OP TCA0372
⚠Q108	4822 209 30442	IC REG NJM79L06A 6V 0.5A
		PV16-MISCELLANEOUS
J101	4822 267 31465	JACK, FPC CONNECT.
		PY16-KEY-SENS / DISPLAY CIRCUIT BOARD
		PY16-CAPACITORS
CY01	4822 122 32486	CERAMIC 0.01µF +80%-20% 50V
CY02	4822 124 90354	ELECT 100µF 16V
CY04	4822 124 22571	ELECT 10µF 50V
CY05	5322 122 32265	CERAMIC 100PF ±5% 50V
CY06	5322 122 32265	CERAMIC 100PF ±5% 50V
CY07	4822 124 22274	ELECT 4.7µF 50V
CY11	4822 124 90353	ELECT 100µF 10V
CY12	4822 122 30103	CERAMIC 0.022µF +80%-20% 50V
CY13	4822 122 30103	CERAMIC 0.022µF +80%-20% 50V
CY52	4822 124 41246	ELECT 47µF 16V
CY61	4822 122 30103	CERAMIC 0.022µF +80%-20% 50V
CY62	4822 124 90365	ELECT 220µF 25V
CY63	4822 124 41536	ELECT 100µF 35V
CY70	4822 122 30103	CERAMIC 0.022µF +80%-20% 50V
CY81	4822 124 21894	ELECT 10µF 16V
CY82	4822 124 21894	ELECT 10µF 16V
		PY16-SEMICONDUCTORS
DY01 ~ DY05	4822 130 33305	DIODE 1SS176, MA165, 1SS254 30V 0.1A
DY08	4822 130 33305	DIODE 1SS176, MA165, 1SS254 30V 0.1A
DY09	4822 130 80319	ZENER DIODE 04AZ9.1, RD9.1ES, MTZJ9.1C
DY54	4822 130 33948	ZENER DIODE 04AZ5.6, RD5.6ES, MTZJ5.6B
DY61	4822 130 80839	DIODE S5688G VRM=400V IO=1A
DY62	4822 130 80839	DIODE S5688G VRM=400V IO=1A
DY81	4822 130 80326	L.E.D LT3D8B RED
DY82	4822 130 33305	DIODE 1SS176.MA165.1SS254
QY01	4822 209 62769	MICROPROCESSOR µPD7537A
QY05	4822 209 62763	IC TC74HC164BP
QY06 ~ QY11	4822 130 63211	DIGITAL TRANSISTOR DTA114TS
QY51	4822 130 42715	TRANSISTOR 2SA608SP, 2SA1048, 2SA1309. 2SA933S
QY52	4822 130 61227	DIGITAL TRANSISTOR DTA114ES
QY53	4822 130 42298	TRANSISITOR 2SC536SP, 2SC2458, 2SC3311, 2SC1740S
QY81	4822 130 61227	DIGITAL TRANSISTOR DTA114ES
QY82	4822 130 63211	DIGITAL TRANSISTOR DTA114TS

REF. DESIG.	PART NO.	DESCRIPTION
QY83	4822 130 60588	DIGITAL TRANSISTOR DTC114ES
QY84	4822 130 42715	2SA608SP. 2SA1048. 2SA1309. 2SA933S
		PY16-MISCELLANEOUS
SY01	4822 276 20508	PUSH SWITCH, REPEAT
SY02	4822 276 20508	PUSH SWITCH, FTS
SY03	4822 276 20508	PUSH SWITCH, OPEN
SY04	4822 276 20508	PUSH SWITCH, PREV TRACK
SY05	4822 276 20508	PUSH SWITCH, NEXT TRACK
SY06	4822 276 20508	PUSH SWITCH, PAUSE
SY07	4822 276 20508	PUSH SWITCH, PLAY/REPLAY
SY08	4822 276 20508	PUSH SWITCH, DISP
SY09	4822 276 20508	PUSH SWITCH, STOP/CM
VY01	4822 130 90441	DISPLAY UNIT
XY01	4822 242 73695	CERAMIC VIBRATOR. CSB590P 590KHZ
ZY01	4822 130 82139	REMOTE RECEIVER PAS-C0617

NOTE ON SAFETY:

Symbol ⚠ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol ⚠ . Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.